THE RED EAGLE

A TALE FOR YOUNG AVIATORS

ALEXANDER KEY

HINSON'S WOODS
BEACON
THIMBLE MOUNTAIN
THUNDERATION ELM
GRADED RUNWAYS
BEACON & BOUNDARY LIGHTS AT CORNERS
WIND INDICATOR
OBSERVATION SILO
JAMESON FIELD
HANGAR
HINSON ROAD
BEACON

CRIPPLE CREEK
ROUGH MOOR
Airplane View of JAMESON FIELD and Surrounding Country
DIRECTION MARKER
N
ORCHARD
TTONWOOD GROVE
THE HOME OF THE JAMESONS
STATE ROAD

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THE RED EAGLE

BEING
THE ADVENTUROUS
TALE of TWO
YOUNG FLYERS

STORY
&
PICTURES
by
ALEXANDER KEY

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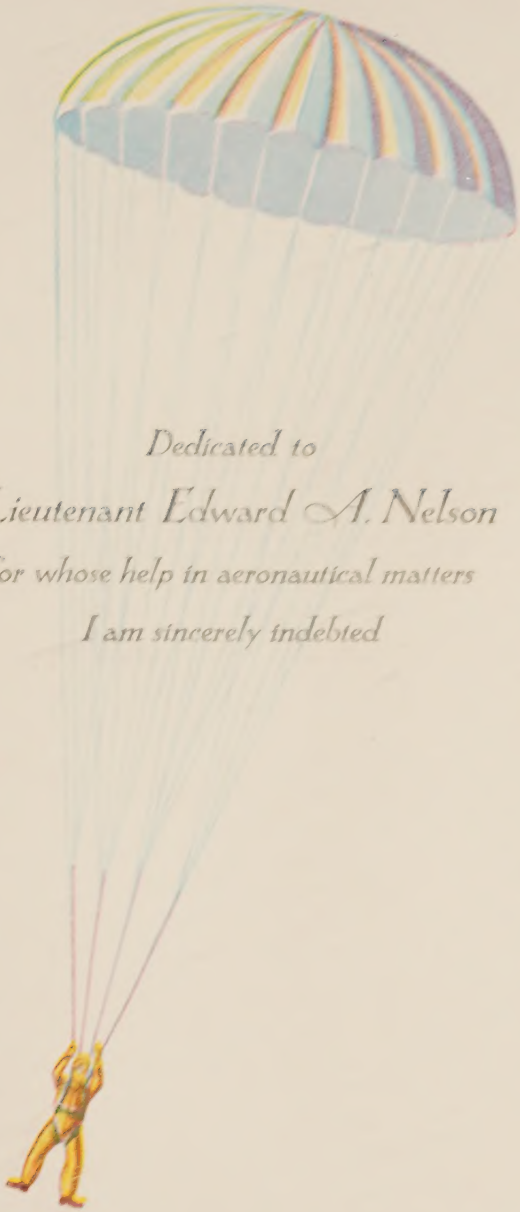

Dedicated to

Lieutenant Edward A. Nelson

for whose help in aeronautical matters

I am sincerely indebted

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The Red Eagle Arrives

AN ACE COMES TO VISIT

I

FOR TWO weeks Ned Jameson and his brother Richard had been working in the large pasture back of the Jameson country home, freeing it of stones and other obstructions that would make airplane landings difficult. The field now presented a perfectly level course, every little hollow had been carefully filled and the ground painstakingly rolled and cleared of shrubs. The great day had come at last, and the boys stood expectantly in the shade of a grove of cottonwoods on one side of the field, impatiently scanning the sky with a pair of field glasses.

"He ought to be here soon," said Richard. "When did Uncle Jim say he would arrive?"

"Some time after lunch," replied his brother. "He's flying a specially built cabin monoplane and it's painted a bright red. Gee, wouldn't it be great if he taught us to fly!"

The light breeze that caused the silvery leaves overhead to dance and flash merrily in the May sunshine veered suddenly in another direction, and at the same moment the boys' sharp ears caught the low distant drone of an airplane motor.

"I hear him," shouted Ned. "There, that must be Uncle

Jim! See that speck away over yonder just above Hinson's woods!"

"It's a red monoplane all right," replied Richard. "Here, take a peek through the glasses!"

In a few minutes the ship was directly overhead and the boys could see the name *Red Eagle* painted on her fuselage. It circled around the field twice and finally, nose to the wind, made a long graceful descent, her wheels skimming the grass lightly for fifty yards and at last coming to a stop two-thirds the distance down the long pasture.

"Come on," cried Ned, and both boys began running as hard as they could in the direction of the plane. The cabin door opened and a tall man stepped out, minus the usual flying suit and goggles that the boys had been expecting. Lines were around the corners of his blue eyes—lines typical of men who spend long hours in the air. His face was lean and somewhat rugged, and a close-cropped mustache partially hid a scar caused by a piece of flying shrapnel during his days as an ace in the Argonne. The Jameson boys were proud of their Uncle Jim.

"Hello," he called to them. "I see I've arrived on schedule time. You've certainly done a fine job fixing up a landing field," he added, looking around him appreciatively.

"Gee, Uncle Jim," Ned said after the excitement of the first greeting was over. "You've got a wonderful ship here! How fast will she go? And why aren't you wearing a helmet?"

Their uncle laughed. "A helmet isn't necessary in a cabin plane; flying clothes are used only in ships with open cockpits, except on rare occasions. And as for speed, the *Red Eagle* should do better than a hundred and sixty-five miles an hour with an open throttle, but her usual cruising speed is around a hundred and forty."

"Will you take us for a ride this afternoon?" asked both boys, almost at the same time. Only once before in their lives had they been in the air. Several years before their father had let them go for a ride in one of the open cockpit

biplanes that had come to the town nearby as a side attraction of a small circus. The prospect of going up in the luxurious red monoplane was an opportunity undreamed of then.

"To be sure, we'll all go for a spin later on in the afternoon," replied their uncle. "There's plenty of room in the cabin for everybody."

Uncle Jim Jameson was part owner of an airplane factory in a distant city, and having been a flyer for years, knew everything there was to know about airplanes. It was seldom that he was able to visit Ned and Richard at their home in the country, but a short time before he had had built for him the monoplane, *Red Eagle,* after designs by the famous Anthony Fokker, Dutch designer of German war-time planes. Traveling then became a simple matter. The ship was powered with a Wright Whirlwind Motor, one of the same type that took Charles Lindbergh across the Atlantic. Built into the ship were a number of recent American improvements that Uncle Jim promised to explain later.

Flying held little interest for Ned's and Richard's father. He had never been up in a plane. He declined to go up in the *Red Eagle;* his curiosity, however, was great enough for him to give the ship a thorough inspection and to marvel at the comfort of her interior.

"I'll come to it sooner or later, I suppose," Mr. Jameson said. "But this afternoon I think I'll sit under a tree and watch you fly around."

"Aw, Dad would rather go out and spend all his time running after a golf ball," said Ned, ducking as his father tossed a small stone at him.

"Well, in my opinion, golf is better than cloud-chasing any day. But just the same," he added, "since the two of you can think of nothing else, I suppose a few flights with as good a pilot as your Uncle Jim won't do you any harm. It'll be a long time, though, before I begin wasting any of my time in the air."

"Just wait," commented his brother, "I'll get you inside the cabin some day, and when you aren't looking I'll lock the door—then you'll have to go up."

Mr. Jameson smiled. "Not if I'm in my right mind."

Ned and Richard climbed into the fuselage. Uncle Jim made a brief but thorough inspection of the motor, stepped inside, locked the door, and took his place at the pilot's seat in the small control room in front and above the main cabin.

"Who's going to crank the propeller?" asked Richard. He was a year older than his brother and more practical in air matters. The boys usually passed for twins, for both had the same thick shock of curly brown hair and grey eyes, but Richard was more stockily built than Ned.

"The *Red Eagle* has a self-starter," replied Uncle Jim. "Now, just watch me."

He turned on a switch with his right hand and pushed a small lever with his foot. The propeller turned slowly a few times, then a rapid popping was audible as each cylinder in turn began to spark. Soon came a low humming as the powerful motor became heated.

"In ships without starters, what does it mean when the pilot cries 'contact,' just before the mechanic twirls the propeller?" Ned asked.

"That's a safety measure for the mechanic," replied Uncle Jim. "When the pilot says 'contact' that means his switch is on. Then the mechanic braces himself to leap away from the propeller as soon as he gives it a jerk. Many men have been killed by being careless when they tried to crank the propeller, and were caught in the powerful suction as the motor started. When the pilot cries 'off,' he means his switch is cut off, and there is no danger of the engine starting."

"Watch this needle," said the flyer, pointing to a dial on the instrument board. "It is the tachometer, and it shows how fast the propeller is turning around. The reading is

now two hundred revolutions per minute; when I push forward on the throttle the needle shows how much faster the propeller is turning. You hardly notice the noise of the motor in this closed cabin, but in a ship with an open cockpit you could hardly hear yourself think."

As he gradually pushed the throttle forward and the propeller gained speed, the *Red Eagle* began to move over the ground. Uncle Jim taxied the plane around until it was at one end of the field, facing the wind. Then pulling the joystick, that came up from the cabin floor between his knees, toward him with his right hand and pushing forward on the throttle with his left, the ship ran swiftly over the smooth meadow for a hundred yards and gradually took to the air.

"Now, see this dial," said Uncle Jim, pointing to another meter in front of him, "it's the altimeter and shows how far above the earth we are. The ground is five hundred feet below. I'm high enough to make a gradual bank and circle back over the field."

As he spoke, he turned the stick slightly to the left, at the same time pushing the left foot pedal. There was a noticeable tilt in that direction, and as the boys looked through the windows at the ground below, it seemed to them that the earth spun slowly around and that the plane was stationary.

"Most planes are so made that the joystick will move in all directions, like the one here. That's the way the Camels and Spads were built that were used during the war. Today, on very large planes and transports, a rocking frame or carriage with a steering wheel in the top is used in place of a stick. It is called the 'Dep' control system. I've always used the joystick so I had it installed here.

"Watch now—when I push the stick forward the nose

of the ship begins to point downward. That is because the elevators are turned down and the tail of the ship is thrown up. Now, see! when I pull the stick back toward me the ship levels off. I'll pull it back a little further and gain some of the altitude I lost.

"The backward and forward movement of the stick controls the elevators. Do you know your plane anatomy, boys, and can you tell me where the elevators are located?"

"Oh, yes," Ned replied, "we've made a lot of model airplanes and know all about the different parts of a ship. Only, we haven't had a chance to find out how a real ship works. The elevators are part of the empennage or tail group. They control the upward and downward movement of the plane."

"Right," commented their uncle with satisfaction. "You'll be real flyers some day. Technically, the elevators are wing surfaces hinged to the trailing edge of the horizontal stabilizer. They control the longitudinal stability and are used for ascending and descending flight."

"What's longitudinal stability?" Ned stammered over the hard words.

"The steadiness of the ship, parallel with the ground," replied Uncle Jim. "Do you want to hear more?"

"Oh, yes, go on!" responded both boys eagerly.

"Next comes the sideways movement of the stick. This lateral or sideways movement controls the ailerons. They are similar to the elevators but are connected to the trailing edges of the wings near the outside extremities. You can see them through the cabin windows. They control the lateral stability of the plane and are used for turning to the right and left. When I wish to go to the left I push the left foot pedal at the same time I move the stick to the left. The stick makes the left aileron force that wing down and the right aileron force the right wing up. The foot pedal on the left makes the rudder move to the left, causing the ship to swing around in that direction."

"But why do you have to bank a ship to make a turn?" asked Ned, puzzled.

"Because, if I didn't bank the ship in the direction I intended to turn," replied the pilot, "and tried to move the rudder while flying on an even keel, the plane would skid in the opposite direction and possibly go into a tail-spin. Unless you were a seasoned flyer or had a great deal of altitude the ship would go out of control and probably crash. And if you bank too suddenly you may do a side-slip in the direction you are turning. You should always have plenty of altitude before attempting a turn."

They were now flying at two thousand feet. The earth, far below, appeared like a vast checkerboard painted in a thousand colors by the setting sun. There were long purple shadows cast by the low hills and rolling stretches of country, the meadows were blue and dark green and brown with occasional spots of flaming color as they were touched by the last rays of the sun.

"Time to go home," said Uncle Jim. "Let's see if either of you two young eagles can pick out our landing field."

For several seconds they gazed below. At last Ned exclaimed, "I see Thimble Mountain, away over to the right."

Thimble Mountain was a small bare hill just beyond the pasture on the Jameson property, rising like a perfectly graded Indian mound from the grassy meadow. It was there that the boys often went to fly their kites and model airplanes on warm summer days.

Uncle Jim began a gradual descent by flying around in ever diminishing circles until he was directly over the pasture. Then, nose to the wind, he made a perfect three point landing, just as the sun was disappearing over the farther rim of Hinson's woods. The stick was locked so that the ailerons and elevators would not be whipped about by the wind; a few stakes were driven into the ground to which the wheels and tail skid were anchored, and the *Red Eagle* was safe for the night from any wandering breeze that might arise.

THE MAKING OF A CONVERT

II

THE FOLLOWING week was a happy one for Ned and Richard. Nearly every day they went flying with Uncle Jim and on several occasions were gone the entire afternoon, passing over distant cities and long sections of rolling prairie country that lay hundreds of miles away from the Jameson home. Each trip brought with it new thrills and further information on aviation.

Just before each take-off, the boys noticed that Uncle Jim was in the habit of adjusting the altimeter, which sometimes read nearly a thousand feet at ground level, back to normal zero.

"What's wrong with it?" asked Ned, the curious.

"Not a thing in the world," replied the flyer. "All altimeters are in reality barometers. Today, the reading is nine hundred feet. That means atmospheric conditions are undisturbed and that we'll have fair weather for awhile. The last time I took off, the weather was wet and cloudy and zero then was recorded under much heavier air pressure than at present. Altimeters register the density of the air, which is heavier at sea level than anywhere else. As we go higher the air is thinner and the altimeter reading is higher.

And, of course, the changing weather always makes a difference in the reading from day to day. That's why the meter has to be set before each flight."

Upon either side of the pilot's seat, near the floor, were round windows like portholes in a ship. Uncle Jim explained:

"I had them built into the plane to facilitate landing and to give a view of the space directly below the path of flight. Many cabin planes are so made that the pilot can see only on each side of him. Here, the curved windows going completely around the top of the cabin in front of the control seat give a perfect view of everything in front and on each side of the ship. The round windows at the bottom, besides showing the ground below, take in a section of the rear."

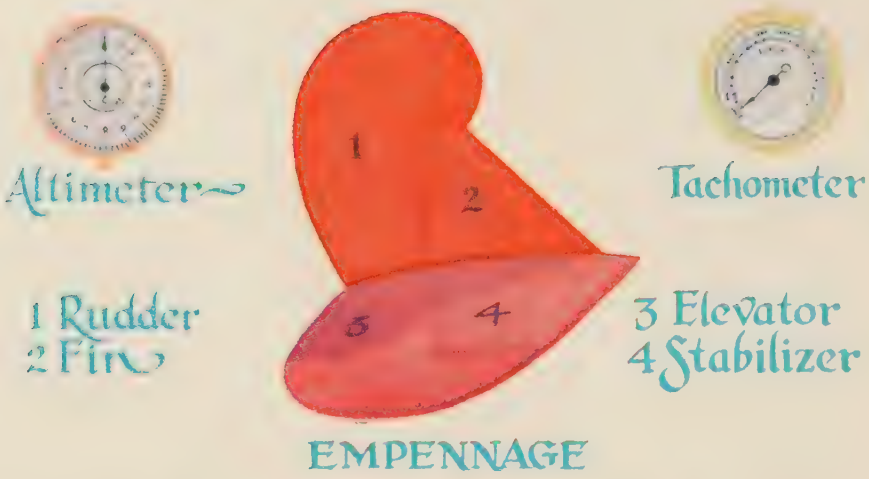
Upon the fore part of one wing, mounted well away from the propeller draft, was a peculiar device that appeared like two tiny funnels fastened with the little ends together, the smaller funnel being in front, facing the direction of flight.

"Is that the air-speed indicator?" asked Ned.

"An excellent guess," replied his uncle. "It connects with the large dial on the upper part of the instrument board. Those funnel-shaped pieces are called venturi tubes, the smaller one in front supplies the pressure on the meter and the larger one behind creates a vacuum so that all the pressure in front will register. This instrument gives the speed of the airplane through air. To determine the ground speed I take the air speed and add or subtract the velocity of the wind, depending on which direction I am flying. The drift meter over here tells me how far off the course I am blown when flying in a straight line."

"I wish you would teach us to fly," said Ned. "Do you suppose Father would give us his permission to learn?"

"You can ask him at dinner this evening," replied Uncle Jim, doubtfully. "But then, to learn flying right, you'd have to take an examination to see if you were really suited to become flyers: like eyesight and equilibrium tests, and

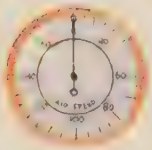


numerous others. Anyway, you could learn the rudiments of the thing and then take your tests some time later when you get through with your ground work."

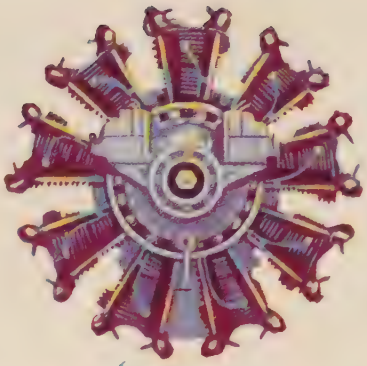
It was after dinner that night before either of the boys thought it advisable to speak to the head of the family on the subject of aviation. Ned knew it would be a hard thing to discuss with anyone as prejudiced as his father, and resolved to be as diplomatic as he could.

Mr. Jameson retired to the library, and settling himself comfortably in a big chair, lit his evening cigar. Before following him into the room, Ned stood looking uncertainly through the doorway at his father. The usually kind face appeared almost stern this evening, and his wide, well-set shoulders appeared almost defiant to the boy. Like Uncle Jim, his father was tall, with the same amiable disposition and love for the out-of-doors. There, however, the resemblance ceased. Although easy-going as long as the world agreed with him, his square face told of a stubbornness and an indomitable will that had earned the respect of his business acquaintances.

Ned took a chair opposite his father, and picking up a golf magazine, began idly turning the pages. Finally he asked:



Air Speed Indicator



The famous WRIGHT WHIRLWIND MOTOR

Earth Inductor Compass

"How did you come out with Mr. Hinson this afternoon, Dad?" Mr. Hinson was their nearest neighbor and often spent an afternoon playing with Mr. Jameson.

"Beat him by only one stroke, son," was the jovial reply. "Why don't you and Richard come along some day and make it a foursome?"

"Thanks, Dad," replied the boy, concealing his distaste for the subject, "we'll be glad to. And say, Dad, I've got something for you."

Reaching into his pocket Ned produced a round object and watched his father's eyes sparkle as he handed it over. "Here's that favorite lucky ball you lost the other day when you were putting over in the pasture. I found it this afternoon. You'd have beaten Mr. Hinson by a dozen more strokes if you could have had it today."

Mr. Jameson's face beamed with pleasure, and he puffed contentedly on his cigar. Suddenly his eyes took on a shrewd look and he turned to his son, a half smile playing about the corners of his mouth.

"All right, Ned, out with it, what was it you wanted me to do for you?"

Ned wriggled uncomfortably in his chair. He had not expected to answer a point-blank question.

"I — er, Uncle Jim said he would teach us to fly if you would let us."

Mr. Jameson stiffened. "You know what I think of aviation, Ned, and I don't want any sons of mine out breaking their necks. It's all right to fly around with Uncle Jim, who knows the game as well as Lindbergh himself, but as for two boys like you and Richard taking up flying—why, it's ridiculous! You're both entirely too young!"

Ned was hurt. He felt that he had bungled matters but he knew better than to argue with his father upon a subject he disliked. He was wondering what to say next when Uncle Jim, who had been standing in the next room, suddenly entered.

"I say, Dick," said the flyer, addressing the older man, "do either of the boys drive a car?"

"Why, yes, of course. They've got a little runabout and I'd say they are right good drivers."

"Well now, Dick," continued the ace, "you've never been in a plane and you don't really know how safe they are. A plane is just as safe as a car, probably more so, because there isn't the danger of being run into by some fool of a reckless driver. Any normal and intelligent person who can drive an automobile can learn to fly a plane equally well. Before you pass judgment on the matter, why don't you come up for a while with me tomorrow and see how flying really is."

"Well, I suppose I'd as soon go up with you as anybody, so I'll follow your suggestion and make my first flight tomorrow after lunch. But just the same," he added, "I think the boys are really too young to meddle in such business."

The next day after lunch Ned and Richard decided to go fishing. "We'd better let Uncle Jim handle Father alone," said Richard. "I don't know what he has up his sleeve but I guess he'll do all he can to make him air-minded."

Cripple Creek was a wide clear stream with a sandy bottom that flowed through Hinson's woods and down one

side of the Jameson property. It was up this stream that the boys went to a large pool shaded by a cluster of aged willows. It was an ideal place, well hidden from chance visitors, where one might sit in the cool shade of the trees with a pole stuck in the bank and idly watch the cork floating about on top of the water. Often the boys came home with a string of pickerel or bass that made their father forget his favorite pastime and go searching in the storeroom for his rod and reel.

On this day, however, the boys felt despondent and had little interest in the prospects of the pool before them. For some time they sat in silence in the shade of their favorite tree and watched the water move silently by. The fish were not biting, and the day being warm, both boys were soon asleep.

The afternoon was half gone when Ned and Richard awoke. "I'll bet Dad didn't stay up thirty minutes with Uncle Jim," said Richard. "And I'll bet you couldn't pay him to take another ride in an airplane."

"I suppose so," answered his brother gloomily. "That's always the way things turn out. And we won't have a chance to go up much more because Uncle Jim is going home in a few days."

"Why, I didn't know that," exclaimed Richard. "What's he going home so soon for?"

"I heard him telling Father the other night," said Ned. "He has to go back East to make plans for an airplane race in the fall. You know, he's president of a flying club back there and the club members are all going to enter their planes in a cross-country flight. I don't know whether he'll be able to come back this summer or not."

"Gosh! I wish he wasn't going home so soon," Richard said. "I wonder—"

"Say! will you look at that!" suddenly cried his brother, pointing to the pole which he had firmly wedged between two roots on the bank. The tip was moving violently up

On Cripple Creek

and down and the line was cutting the water back and forth like a knife.

He gave an excited whoop and jumped for the pole, seizing it in both hands. "I've got a big one," he cried. "Look!" Pulling as hard as he could he finally landed the fish, a magnificent pickerel that made Richard's grey eyes turn green with envy. "My, isn't that a fish!" he said proudly. "Just look at him Richard."

But Richard was gazing at the water with a puzzled expression on his face. "Look here, Ned," he asked, "where's my pole? I don't see it anywhere."

"Must have floated off downstream while we were asleep," was the none too comforting response. "Better go look for it, I'm going to fish some more."

Richard sauntered dejectedly off down the bank of the creek while Ned rebaited his hook and again planted his pole firmly between the two roots on the bank. The afternoon wore on. Occasionally Ned had a nibble on his hook, but he caught nothing. A locust, in the branches over his head, was singing his strange sizzling song, telling of dry weather and drowsy days. Almost before he knew it his head began to nod.

He was hailed by a cheery voice; looking up he saw Richard approaching, pole in hand. His clothes were dripping wet but there was a happy smile on his face, and he was holding something out of sight behind him with one hand.

"Oh, Ned, how heavy was that fish you caught?"

"A lot heavier than anything you'll ever catch," was the merry response.

"We'll just see about that. Take a look at this!"

Slowly he brought his hand from behind his back; from it there hung a big fish, a monstrous black bass!

"What did you do?" queried Ned. "Dive in the water and catch it with your hands?"

"Pretty nearly had to," answered his brother. "I went

away down stream and at last I saw my pole, flopping around in the water as if it had come to life. Then this fish hopped up with the hook in his mouth so I just jumped in and grabbed the pole before he got away. I'll bet that's what pulled the pole in the water when we were asleep!"

"Let's see which one is the biggest," said Ned. They weighed their catches on Richard's pocket scales. "A tie!" he exclaimed. Both fish were exactly the same weight!

The shadows around them were beginning to lengthen and in the distance the trees stood silhouetted in the first flush of evening color. "Better be getting home for supper," said Richard. "I'd like to know how Father enjoyed his first ride."

"Huh, the evening meal is called *dinner* when we have company," corrected Ned.

"Well, it may be, but we're living in the country and it's always *supper* to me."

It was dark when they reached home and Abbie, the cook, was anxiously waiting for them. Abbie's full name was Abigail Abbott. She was short, plump and jolly, and besides being very capable in the kitchen, fulfilled the position of housekeeper as well. Without Abbie, the three Jamesons would have been totally lost.

"Heavens above!" she exclaimed, as she beheld the fish. "Did you ever see such monsters? But you are late for dinner and everything is getting cold. Do hurry and eat. You'd better change those wet clothes, Richard, or you'll catch your death of cold."

"Where's Dad?" asked Ned.

Abbie threw up her hands. "I've never seen anything like those two men. Your father declared he'd never go up in one of those terrible flying businesses—and here he's been gone in one all afternoon and it's dark already. I don't know what to make of it unless they've had an accident or something!"

Ned looked at Richard. "Aw, they couldn't have had

an accident, Abbie. Uncle Jim's too good a pilot for that kind of thing. I guess they had a little engine trouble and flew down somewhere for repairs." Nevertheless, the boys were worried, for it seemed unlikely that their father would consent to spend so much time in the air.

Richard substituted dry clothes for his wet ones, and the boys ate their dinner in silence, each one wondering what could be the reason for the *Red Eagle*'s long absence. When they were through they went out to the pasture and sat down in front of the barn.

"There's no moon tonight and I don't see how he's going to land in the dark," said Richard. "Uncle Jim's plane has landing lights on her wings but I don't understand how they would be of much help without regular landing field lighting."

"We could drive our car down and park it at the head of the field with the lights turned on," suggested Ned.

"The ignition isn't working," said Richard, "and Dad's car is in town in the garage. I guess the only thing to do is to wait for a while and see what happens."

For an hour they sat quietly in front of the barn. Once they heard the low hum of an airplane motor and for a few minutes they thought it was the *Red Eagle* returning. But it was only the mail plane that came over the Jameson place every night.

A half hour later Ned said, "Do you hear that?"

A scarcely perceptible droning filled the air. In a short time the lights of an airplane appeared in the distance.

"It's a cabin plane," said Ned. "See how it's lighted."

As the ship approached it began circling around the field, gradually coming closer to the ground. "It's Uncle Jim's plane, all right, but I don't see how he's going to land in the dark," said Richard.

Another minute went by and then an unexpected thing happened. The ship made a sudden dive downward, and when it was only a few hundred feet from the ground, a

flaming object dropped from it. As it touched the ground the entire field was brilliantly illuminated.

"A flare!" exclaimed Ned. "I didn't think of that."

The *Red Eagle* circled around once more and then glided easily down to the illuminated field, coming to a stop a short distance from the boys.

There was a look of suppressed excitement in Mr. Jameson's eyes as he stepped from the cabin, but he said little as the four walked back to the house. Uncle Jim winked at the boys but offered no explanation.

That evening after Ned and Richard had gone to bed they heard their father and Uncle Jim conversing behind the closed door of the library long into the night, but neither could imagine the meaning of the strange conference.

THE HANGAR

III

"DO YOU know, Uncle Jim said he was going home this afternoon. He was talking about it after breakfast. I think that's funny," said Ned, the next morning. "I thought he was going to stay a week longer."

"Tell you what," said Richard. "Until time for Uncle Jim to leave, let's go out to the workshop and finish up that transport model."

The boys' workshop was located in the old silo that stood by the barn at one end of the pasture. Neither had been used for many years, but they were still kept in repair and the barn was given a coat of red paint once in a while. The previous summer, the silo had been cleaned out and the lower part transformed into a comfortable room. Here, the boys had installed a workbench with an electric saw, and had lined the walls with a complete set of tools. The place was comfortably furnished with built-in seats, a table, and a bookshelf filled with volumes on mechanics and model airplane building. Suspended from wires overhead that stretched across the room were a half dozen flying airplane models that Ned and Richard had built.

The transport plane was by far the largest model that

they had attempted and one that had needed many days for its completion. For some reason it had refused to fly and its makers, after much consultation and study of the technical library, decided to rebuild the tail group.

They soon became absorbed in their task, and finding the adjustment of the elevators and horizontal stabilizer a difficult undertaking, hardly noticed the passage of time. Before they realized it they were aroused by the roar of the *Red Eagle*'s powerful engine, and rushing to the door were just in time to see it moving swiftly across the field.

"Why, he's going," cried Ned. "And we didn't tell him goodbye!"

"You mean, he's gone!" said Richard.

Both boys ran out into the field, waving their hands at the great plane as it circled around and headed for its long flight eastward. When the *Red Eagle* had disappeared in the distance, a great feeling of loneliness come over them, as though they had lost their best friend. There was no one now to sympathize with them in their interests, and no one to explain the absorbing details of their hobby.

They went dejectedly back to the workshop in the silo, but for a long time both sat silently in front of the transport model, as if the problems of the empennage were too great to be solved. The sound of their father's voice outside brought them to attention again.

"That sounds like the voice of Burke, the carpenter, answering Dad," said Richard. "I wonder what he's going to have done around here?"

"Dunno," replied his brother, without interest. "He's always having Burke over to fix a fence or something."

"Sounds as if they were talking about having the barn remodeled," said Richard. "Let's go out and see."

In front of the barn were Mr. Jameson, Burke the carpenter and his assistant. As the boys approached, it seemed to Ned that the men lowered their voices so that they could not be heard.

"Is anything wrong with the barn?" asked Richard.

"It needs a few improvements," answered his father evasively. "And by the way, boys, I want you to get your things out of the silo by tomorrow. Mr. Burke will have a little work to do in there also."

"But, Dad," said Richard, "I thought you told us we could always have that for our workshop. What are we going to do?"

"Never mind about the workshop now, Son, just take your things out so they won't be in the way. You can have the silo back in a few days. Mr. Burke will have a half-dozen men down here tomorrow morning to recondition the barn and repair the silo. The workbench can stay there, for the men might want to use it, but take your models and the other things out and put them in the basement at home so nothing will be damaged."

Richard was puzzled, but knew better than to question his father any longer. As they walked back to the shop, Ned said, "I wonder what in the world he's going to do with the barn remodeled? He's got a garage near the house, and he doesn't like horses, so he wouldn't be making a stable out of it."

"He might have decided to start a fancy dairy like Mr. Hinson's."

"I can't imagine Dad becoming interested in cattle," was Ned's reply. "No use trying to guess what's on his mind from one day to the next. Let's take our things out of the shop now and get it over with. We can work on the transport model at home."

The next morning the boys were awakened by the sound of hammering from the region of the barn.

"I wonder what Mr. Jameson is having done out there," said Abbie, as they sat down at the breakfast table. "He had his breakfast an hour ago and is out at the barn with a whole drove of carpenters."

Ned and Richard shrugged and went on eating; they hated to let Abbie know that they were as curious as herself.

As soon as the morning meal was over, they went out to the pasture to watch the carpenters at work. The old barn was a large one, somewhat in need of a coat of paint. but its timbers were solid and its foundation good. Its longer side with the wide double doors faced the pasture. On one end was built the tall stone silo that for years had been a picturesque landmark in the country. Burke and his men were busy tearing out the side of the barn that faced the field, as though the doors were to be enlarged. The roof was being changed and reshingled. Inside, the men were tearing down the partitions. It was all very interesting to the boys and their curiosity was soon forgotten in their eagerness to help the men at work.

Throughout the next three weeks a great change came over the old barn and silo, as well as the pasture itself. Great sliding doors covered the north side of the structure. These could all be rolled to one side, leaving the front entirely open. The interior was one room, covered with a cement floor. Large windows were built across the back and sides and at one corner gas and oil tanks were sunk into the floor. To the delight of Ned and Richard, a winding stairway was built in the silo leading to the top. Its sides were pierced with little windows, the old roof was torn off and a platform built within the walls, three feet from the top. The silo now gave the appearance of a medieval tower guarding the estate.

But to all their queries their father presented a grin and a knowing shake of his head. They soon grew tired of asking unanswered questions, and all their time was absorbed in watching the painters at work.

Before long the barn shone like new with a coat of glossy white paint and men were on the roof, for some unexplained

reason, putting big streaks of white on the red shingles. Ned and Richard were puzzled but they were unable to see what was being done, for the roof had been greatly flattened during the alterations.

The field could no longer be called a mere pasture. It had been carefully graded and rolled and a wide cinder track led from the barn doors nearly to the other end of it. Here it was pointed like an arrow and a great white cement "N" was sunk in the grass just beyond the point. Two other cinder tracks ran diagonally across the field to each corner.

In another week everything was finished and the workmen departed for home, leaving the Jameson place very different from the way it had looked a month before.

The transport model was finished and gave every indication of being able to fly. For the first time in weeks Ned and Richard had nothing to keep them at home, so the two made their way to the top of Thimble Mountain to give it a trial.

Below them could be seen the large field with its crossing runways and the remodeled barn at the further end. Ned was winding one of the motors of the transport when he suddenly stopped, stood up, and pointed to the barn. "Will you just look at that! We couldn't see it before because the roof was changed and the silo steps were being painted." In huge white letters on the red shingles Richard saw the words JAMESON FIELD!

"Now I know why father was so long up in the air with Uncle Jim," said Richard. "I've been thinking all the time that the barn was beginning to look like a hangar, but I wasn't sure. Dad's certainly become air-minded, but I don't see how Uncle Jim ever brought him around to it. This must have been what they were talking about that night."

"Yes," said Ned. "Uncle Jim was helping him plan how the place was to be fixed up. Of course Dad must be going to get a plane of *some* kind."

"It's hard to believe but I suppose you're right," Richard said. "And those holes the electricians were digging at the corners of the field yesterday must be for beacon lights. And look—there's the wind indicator on the pole on top of the silo. Uncle Jim always calls it the 'sock.' "

"They've put a big light on the top of the silo overlooking the barn roof. I guess that's to light up the name on the roof at night so it can be seen from above. See that box-like thing with the glass front at one end of the barn? I'll bet it's a flood light for landing at night. It looks like a picture of one I saw in one of our airplane books."

The transport model was temporarily forgotten in the thought of an aeronautical future.

"Dad's funny about some things," continued Ned. "When he becomes interested in something he goes in for it seriously. I'd like to know what kind of plane he's going to get. And just think, maybe he's changed his mind about not letting us learn to fly."

"Well," said Richard at last, "if we're going to test this transport model today we'd better hurry up. There's no wind to bother us now."

The tedious task of winding the rubber motors was at last accomplished and the frail ship was placed on the long plank runway that the boys had built for their models to take off under their own power. The runway led to the edge of the hill where the ground suddenly dipped away at a sharp angle toward the field below. The model planes, coming to the end of the runway, would generally drop slightly as they struck the empty air, and if successful, would slowly begin to rise and fly halfway across the pasture. If the ship would not fly on coming to the end of the runway, it would merely drop down undamaged in the thick grass that grew on the side of the hill.

The transport model, as if impatient for the air, went whirring down the runway and began to rise before it came to the end. Just as it sailed over the edge of Thimble Mountain, a playful wind blew up from the field, catching the ship from underneath and sending it high into the air.

Ned yelled in delight and went somersaulting over the hillside, and regaining his feet, raced with Richard pell mell down the hill trying to keep up with the ship. "Just look at her go!" cried Richard. "She's the best flyer we've got."

The transport was now sixty feet over their heads, sailing straight across the landing field to the cottonwood grove on the other side.

"If she goes across the field, she'll crash in the grove," shouted Ned.

"If she'll just hold her altitude, she'll be all right," panted Richard.

But as the transport drew nearer the cottonwoods it seemed as if a guiding hand were at the controls, for she made a graceful bank and began flying back in the direction from which she had come. It was the longest and most successful trip that any of their models had made, for the plane was nearly across the field again before it began to glide to the ground.

Too absorbed were Ned and Richard in the antics of their model to notice a small speck in the sky over the northeastern edge of the orchard. Minute by minute it grew larger, and almost before they knew it, a large monoplane was circling overhead. Astonished they looked up, and in a twinkling the transport model was entirely forgotten. For the airplane was painted a flaming color and on its fuselage, in white letters, was the name *Red Eagle!*

The Discovery

THE MYSTERIOUS PACKAGE

IV

"THINGS look very different from the way they did on my last visit," said Uncle Jim, after the red monoplane had been run into the hangar. "I'm wondering what your father means by all this airport business he's fixed up here?" But there was a mischievous twinkle in his eye as he spoke and both boys laughed happily.

"Uncle Jim, you know all about it," said Richard. "Please tell us what Dad said when you took him up."

"Well, he hadn't been in the air very long before he began saying that flying wasn't so bad after all. And of course we stayed up a long time so he'd have a chance to learn a little bit about it."

"That wasn't all you talked about," chimed in Ned. "When's Dad going to get an airplane?"

"Just control your curiosity, young man," laughed the flyer. "You'll find out all about it soon enough. But I'll tell you right now that he's not going to get a plane for some time to come. He's got to learn something about flying first."

The boys looked disappointed. "But why did he build a hangar?"

"Oh, that's just an accommodation for visitors like myself," was the answer. But again he laughed, and the brothers felt that there was a mystery somewhere that neither their father nor Uncle Jim was ready to disclose.

That night the two men again sat behind the closed doors of the library and talked until long after Ned and Richard had gone to bed. The next morning a huge freight package was delivered to the Jameson place and put beside the *Red Eagle* in the hangar.

Both boys were on hand examining the large crate curiously when the men arrived. It was nearly thirty feet long, stood higher than their heads, and was four feet across the end. Pasted all over it were big stickers reading, "Fragile," and, "Handle with care." On one corner was the name of Uncle Jim's airplane factory.

With hammers the men began to work on the crate and in a few minutes they had removed one side. Mr. Jameson turned to Richard. "Wouldn't you and Ned like to go fishing this morning? I really don't believe there's much around here you would be interested in." But his face was not serious as he spoke.

"Aw, Dad, we don't want to go fishing," replied his son. "Can't we stay here and help you? Is that an airplane in the crate?"

"Well, boys," said Mr. Jameson, "I suppose the time has come to tell our little secret, especially since the thing inside the crate is really meant for both of you."

Ned and Richard gasped in surprise. "But Uncle Jim said it wasn't an airplane. Please tell us what it is." Their excitement was nearly beyond control.

"Uncle Jim is right," continued their father. "This is not an airplane, in the usual sense of the word, but it's a very close relative of one. Now, lend a hand while we unpack."

First from the side of the crate came four long flat packages shaped like the wings of the *Red Eagle,* only much

smaller. Next came a long cigar-shaped affair that occupied most of the room in the crate. Last of all they drew out two smaller packages, carefully wrapped, and padded like the rest to prevent damage.

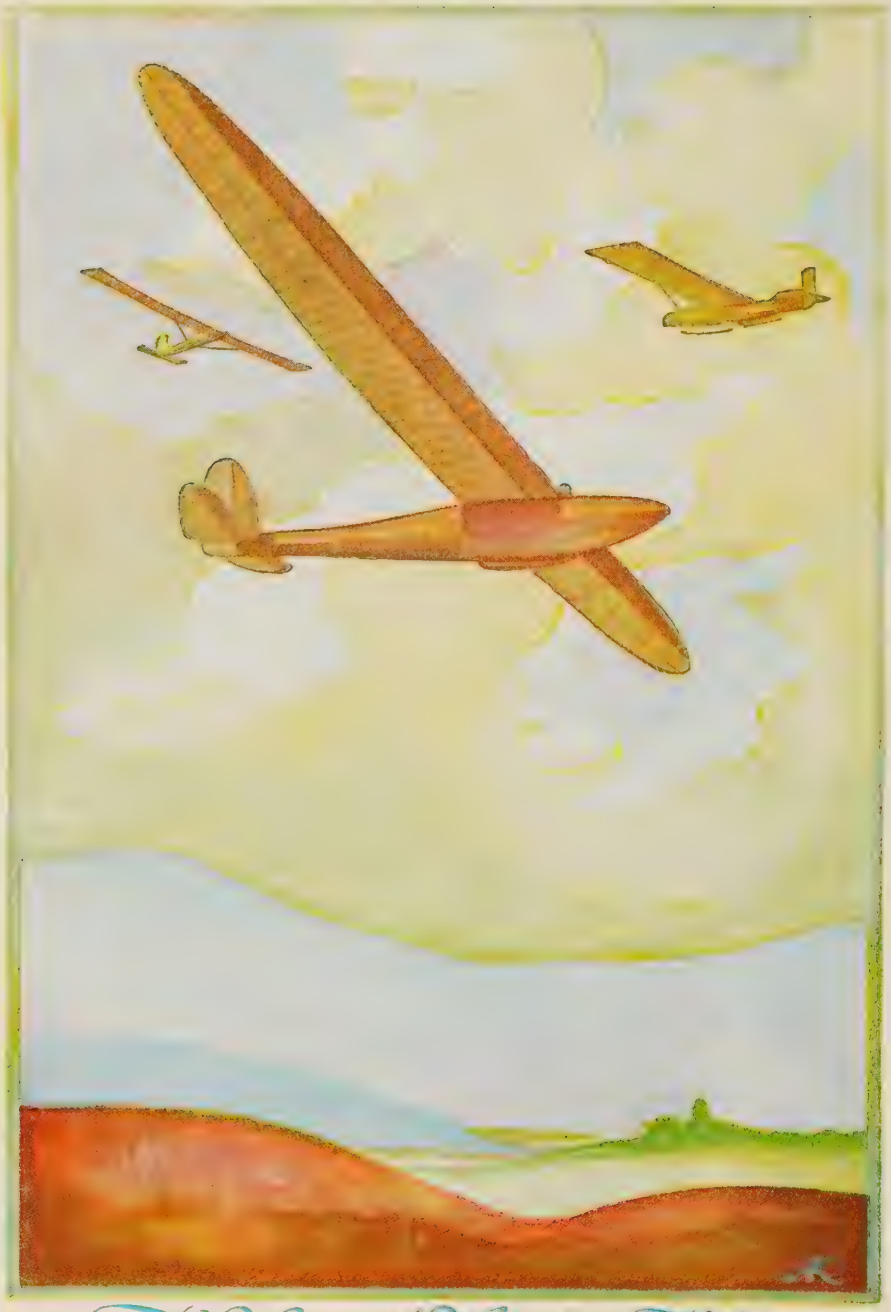
Uncle Jim began stripping the heavy paper away from the largest package and in a few minutes they saw a glistening body shaped like a miniature fuselage of an airplane. In the front were two seats, one directly behind the other. It was incredibly light for its size and possessed great strength.

"Oh! it's a glider!" exclaimed Ned. "And are you really going to let us learn to fly in it, Dad?"

"That's just why we got it, boys," said Mr. Jameson. "You see, after talking things over with Uncle Jim, we decided that a compromise could be made somewhere so you could learn aviation without the usual danger attached to flying a regular airplane. As he tells me, a *glider* isn't at all dangerous if you are careful, because it is light and doesn't travel too fast. I'm quite willing for you boys to take up gliding, with certain limitations of course; but you've got to let me be a third member of the class. I'm afraid I've become almost as interested in the air as the rest of you."

Ned and Richard fairly jumped for joy. At last their hopes were beginning to be realized. They would learn to fly, if only in a glider. Father had been won over to their side, and there was no telling what he would be willing to do in the future. Both had hoped that he would get a real plane. Perhaps some day their wish would be fulfilled; but in the meantime—what sport the glider would be!

Uncle Jim had stripped the paper wrapping from two of the flat packages, which turned out to be the wings, and under his guidance the prospective aeronauts began to fasten the glider together. This was easily done for it had been carefully designed and made to permit speedy assembling. The two wing sections locked together over the cen-



The Magic of Motorless Flight

ter line of the fuselage and were braced to it by four long struts, two on either side, that ran from the bottom of the rear seat to a space one third the distance out on each wing section. The tail fin, rudder, and the horizontal stabilizer with the elevators attached were taken from a smaller package and installed at the rear of the fuselage.

With all the wing surfaces attached the glider resembled a huge graceful bird. The taut varnished silk that covered every part of it glistened in the sunlight that streamed in through the windows. In many respects it was like a small monoplane without an engine except for its more delicate construction and the notable absence of landing wheels. In place of these were skids, extending down only a few inches and stream-lined into the fuselage. The controls were like those of an ordinary airplane except that a crossbar operated by the feet controlled the rudder. The *Red Eagle* had foot pedals for rudder control. Uncle Jim was busy attaching the stranded wire connections between the crossbar and rudder and the joystick, ailerons and elevators.

"Now we are ready for a few explanations and a test flight," he said as the last wire connection was made. "Any questions before I begin?"

"Yes, sir," replied Richard. "I'd like to know what those other two big flat packages are that look like wings?"

"They are extra wings, but of a little different type from the ones we are using now. They are for more advanced flying."

"But how do you start the glider, Uncle Jim, if it has no motor?" asked Ned.

"Simply by pushing it off the top of a steep hill like Thimble Mountain or else giving it a jerk with an elastic rope like the one you'll find in that bundle stored in the front seat."

"Tell the boys something about gliders and how they were developed, Jim," said Mr. Jameson.

"It's an interesting story and one that you should all

know," said the flyer, "so everybody take a seat over by the window and I'll give you a bit of gliding history.

"Gliding was originally developed in Germany by Otto Lilienthal back in 1894. He flew, or rather glided about six hundred feet. Gliding was continued until six years later when the Wright Brothers flew at Kitty Hawk, North Carolina. After the development of the glider propelled with an engine, which has become the airplane of today, very little attention was paid to true gliding. But at the end of the World War Germany was restricted in the use of motored planes, and her attention again turned to this form of flying.

"In the Rhön mountains competitions for motorless planes were held and great advances made in the art. At that time the greatest distance flown was little more than a mile and the glide lasted only a few minutes. Today, German gliders are able to stay in the air all day long and can fly their ship in any direction they wish to go."

"But Uncle Jim," cried Richard, "that sounds impossible! How can anyone stay in the air all day long without an engine?"

"Yes, it does sound fantastic," was the answer, "but it is being done every day. I'll explain in a minute. There are two types of gliders; one, the simple glider with wings proportionately the size of those on an airplane, is used by beginners and is capable only of short flights. The other type is known as a sail plane and is capable of remaining aloft for many hours at a time. In the sail plane, the wings are extremely long and narrow, some having a span of sixty feet. They have to be narrow, for broad ones create too many eddies, and they must be long to provide enough wing surface to lift a man's weight. You will notice that we have an extra pair of wings in those other two packages. They are for sail flying. See how long and narrow they are in comparison with the ones on the glider. I had the glider planned so that it could also be used as a sail plane after

you become expert in the use of it. The wings are so made they will fold back out of the way as on a number of modern airplanes. There is also a place under the fuselage where a pair of small wheels, which are packed in one of the seats, can be easily attached. The purpose of the folding wings and wheels is to provide an easy method of towing the glider home should we be forced to land any distance from the field."

"What is that hook on the nose of the fuselage for?" inquired Ned.

"That's where the rubber rope is fastened. In taking off on level ground it will be necessary to use it as a catapult, although it is always used in places where there is no strong wind to give the glider a start of its own accord.

"It is always necessary to start a sail plane with the rubber rope. A sail plane has to be started with great speed because if it were started slowly it would only tumble about in the air like a leaf and get at once out of control.

"Now I'll explain how a sail plane flies without power of its own. Its reservoir of power is in reality its altitude. The higher the altitude, the longer it will take the gravitation of the earth to pull it to the ground. Altitude in a sail plane is reached and maintained through the use of upward air currents. When the wind blows against the sides of houses, low hills or forests it is directed upward. A good example of this principle can be found in swift rivers where the water piles upward over the rocks in midstream.

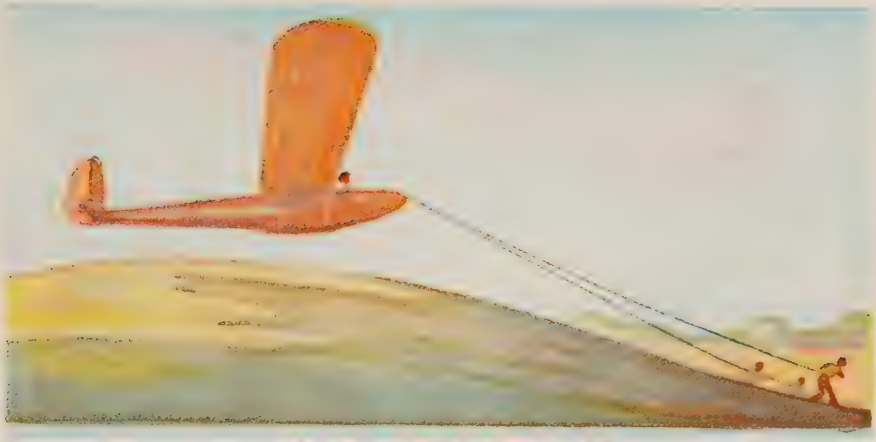
"After the take-off in a sail plane the pilot turns the nose of the ship slightly towards the ground. Immediately the gravitation begins to take effect. The plane moves swiftly forward and the pilot guides it over a rise in the land where an upward air current is likely to be found. Then he will be seen suddenly to rise upward fifty, a hundred, or even two hundred feet. To an onlooker it is all very amazing and mysterious. The principle of the sail

plane's flight seems very involved because the plane is always kept gliding earthward and at the same time is being lifted upward. It was only a few years ago that this fact of upward air currents was discovered. Just recently gliders have found that certain cloud formations create a tremendous suction in the air and that it is possible for a sail plane to travel miles under one of them. Even the reflection of the sun on certain objects, such as house tops, water, or areas of stone will create these rising currents of air so they can be used by the cross country glider.

"Most aviators know very little about the action of these cross currents, because the powerful motored craft which they fly are very little affected by them. At the same time I believe that gliding is the best way to begin the study of aviation, for one can become an expert flyer with very little danger attached to his training. In Germany today every school boy of fourteen years of age is eligible to free gliding instruction."

"Gosh! that sounds thrilling," said Richard. "Won't we have a lot of fun sailing around the country in the glider? And Ned, it's got two seats and we'll be able to fly together. Just think of being up in the air, passing over houses and people without a single sound to let them know we're there!"

"You mustn't be impatient, boys," said their uncle. "It'll be a good many days before you can master the trick of gliding well enough to do sail flying. But we've had enough of history, and we've got a perfectly good afternoon ahead of us for our first lesson. After lunch we'll take the glider out to Thimble Mountain for a tryout."



GLIDING

V

THE GLIDER had been pulled to the top of Thimble Mountain, the wheels were detached and the three students, father and sons, stood waiting expectantly.

Uncle Jim gave a preliminary explanation of the controls and climbed into the rear cockpit, which was just in front of the wings. He leaned back against the short support to which the wing sections were locked and strapped himself to the seat with a wide cotton belt. "I'm going to make a short glide first and show you how the thing performs. Notice that I now pull the stick toward me until the elevators are in a neutral position. As soon as I get into the air I will push the stick slightly forward so that the plane will be inclined to the ground."

There was very little wind, so after a brief direction from the aviator, the rubber rope was passed through the hook in front and the three students took their positions to jerk the glider into the air. The rope was attached in the center with some sixty feet trailing off in front of each side of the glider so that there would be no danger of anyone being struck by the edge of the wings. It was held taut by Mr. Jameson on one side and the boys on the

other. At a given signal from the aviator, they all began running forward as fast as they could, at the same time jerking the elastic rope.

The glider shot lightly into the air and its pilot, skilfully working the controls, maneuvered it in a curve in the direction of the hangar several hundred yards away. Soaring sixty feet in the air over the field, Uncle Jim made an easy bank as he neared the south end of the runway and then began a gradual incline to the ground, landing past the tip of the arrow at the north end of Jameson Field. It was a beautiful glide, one that would have been envied even by another expert.

The wheels were attached and the glider was again dragged to the top of Thimble Mountain. "Father will be next," said Uncle Jim. "But don't try anything as fancy as that until you've had a few days' practice. And remember, keep the stick in a neutral position until you are in the air and then push it slightly forward. If you begin to tilt the slightest movement of the stick in the opposite direction will right you. Don't use the rudder controls unless you begin to turn. The wind is coming from the northeast, so you will have a good long stretch of open ground ahead of you, even if you go past the north boundary of the field. Pick out a certain spot ahead and keep your eyes on it instead of on the ground below."

Again the glider was started upward, the boys' father at the controls. Gliding into the wind, the craft made good progress the first hundred feet, then it began to wobble and turn uncertainly on its downward glide.

"He's a little clumsy with the stick," said Uncle Jim. "It's hard for a beginner to realize that the slightest movement on his part will be duplicated in the glider."

At last their father's first flight came to an end and the glider settled softly to the ground on a tuft of tall grass that marked where the fence had been a few weeks earlier. Beyond was a rough moor that led away to the creek.

"In spite of a little unevenness of flight, you did better than I expected, Dick," complimented the owner of the red monoplane. "The next time, go easy on the controls and you'll find the glider will behave much better. When a ship wobbles too much there is always danger of a side-slip. And remember, if you start slipping, cut your rudder around in the direction of the slip and you'll come out of it.

"Richard, you're next. Pull the stick back to a neutral position, not too far back, because you might go up too steeply and slip backward. And when you get into the air, push forward on the stick. The more you push forward, the more abrupt will be your incline to the ground and the faster you will go. When you get within a few feet of the earth it is best to pull the stick back and bring the ship to an even keel."

The aviator took one side of the starting rope and his father took the other. "All set?" shouted the former. Richard held up his hand. The glider began to move forward over the ground and in a second shot upward over the brow of Thimble Mountain.

Before the take-off Richard had been nervous. Now he was alone in the air, the wind whistling through the struts and beating across his face. He felt exhilarated and completely master of himself. He was a great bird soaring across the field, no longer a mere being like others who could only look enviously at a swallow overhead and regret they themselves were earth-bound. Below he could see the members of the party trotting briskly to the north end of the field, Uncle Jim carrying the wheels of the glider under his arm. A few more seconds and he would have to land. He wished that he might fly for a long time. The glider began to wobble slightly but in a moment he had righted it with a gentle pressure on the stick. The ground seemed suddenly coming up to meet him, so he pulled back on the control and began to sink more gently. He was nearly at the end of the field and still had twenty feet of altitude. Then mysteriously

the ground seemed to sink beneath him until he was twice as far away; he had passed through an upward air current and had gained altitude. Again he slowly began to sink until he was halfway across the moor.

Suddenly, it seemed, the ground came tearing up to meet him. In desperation he jerked back on the stick. Too late! There was a thud, the glider struck the earth at an alarming angle, burying her nose a foot deep in the spongy turf of the moor! There she remained, with her fuselage sticking high into the air, until the rest came up.

Richard climbed out, unhurt, and looked sadly at the glider. "You're almost a born aviator, Son," said Uncle Jim. "But you mustn't let a bungled landing bother you. Landings are always the hardest for beginners, it's so difficult to judge the distance to the ground. Watch your stick, and hereafter, don't allow it to slip forward too far when coming down."

The glider was pulled out, and after they had cleaned off the dirt, it was found to be as good as ever. Twenty minutes later, they were back on Thimble Mountain.

At last came Ned's turn in the air. He was even more nervous than Richard had been, but grinned bravely over the edge of the cockpit and held up his hand for the start. Up the glider went, higher and higher. It was on a steep incline and in a few seconds he had gained more altitude than anyone else during the afternoon's flying. When he had reached a point where the impetus of the start began to fail he was startled by a shout from Uncle Jim below:

"Forward on the stick, Ned! Forward!"

Quickly the boy pushed forward on the control, the glider seemed to hang motionless in the air for a moment as if undecided which way to fall, then slowly it began to move forward, gathering speed as it went. The glide was completed without mishap and Ned landed a short distance behind the mark set by his brother.

"That was a dangerous ascent you made," said Uncle Jim as the glider was being towed back across the field. "For a while I was afraid you were going to slip backward. A steep ascent looks nice, but you must be careful not to pull the stick so far back because it's very unsafe. Always keep the nose of the glider lower than the tail."

For several days everything went well with the gliders. Both Ned and Richard learned to make a satisfactory S curve, and once their father piloted the plane on a very long glide that took him across the northeast corner of the field, over the moor and creek, and beyond the state road to a small hill nearly a mile and a half from Thimble Mountain. Although not an exceptional glide for an experienced flyer, it won Uncle Jim's admiration. He declared his brother would establish a world's record if he kept on.

The world's record was nearly established the following day but in a totally unexpected manner. Their father had become expert with the controls and was able to fly in a circle around the field. On his last take-off that morning the starting rope became fouled on the hook and the glider was thrown sideward into a stiff breeze.

Midway between Thimble Mountain and the hangar was a wide-spreading elm tree that grew just beyond the boundary of the field. It was a beautiful tree, and its arching, fan-like branches had always seemed quite peaceful to the boys. Today, however, there was something distinctly threatening in the attitude of those spreading branches. Breathlessly, they watched the glider, their eyes darting from it to the tree. They saw their father working desperately at the controls, and Uncle Jim running forward, shouting advice. The glider refused to respond, and like a dried leaf whipped about by the wind, it began slipping first to one side and then to the other. No movement on the part of the pilot appeared to have any effect other than to make conditions worse.

Then suddenly the glider seemed to take matters into its own hands, for it sideslipped at a sharp angle, and spinning halfway around, slid into the thick foliage at the top of the elm! Simultaneously came the sound of cracking branches and tearing silk!

When Ned and Richard arrived upon the scene, the head of the Jameson household was loudly berating the tree and using very appropriate language for the occasion. "Thunderation!" he shouted. "This darn tree ought to be cut down. Just look what a fine mess it's made of things! Thunderation!"

In a few minutes long ladders were brought, and with the help of the gardener and chauffeur, the stranded aeronaut was released from his perch. Removing the glider without further damage was more difficult, but it was finally accomplished by letting it down from the top of the tree with long ropes attached to either end.

"You made a better landing than you first imagined," said Uncle Jim. "If you hadn't fallen into the tree you would have crashed to the ground and broken one wing all to pieces. I'll have to work on that hook so the rope will be sure to detach itself after this. It wasn't your fault.

Dick. As I said before, accidents like this will always happen in the first stages of gliding."

Later, the boys pleaded that the tree be spared and with due solemnity they placed a small sign upon its trunk. This is how it read:

> On June 12, in the year of Our Lord, 1930, be it known that glider pilot, R. A. Jameson, tiring of the established order of things and deciding to attempt a new world's record, duly landed his glider in the top of this tree and christened it—
>
> THUNDERATION ELM

The afternoon was spent in repairing the damage wrought by the tree. From the unopened package in the crate a bundle of airplane silk, a can of "dope," and a large assortment of extra framework pieces were produced. The rudder had suffered the worst damage, so the covering was stripped from it and the woodwork repaired. The rudder frame was then covered with new silk and varnished with the dope. In a short time the solution had dried, leaving the covering waterproof and stretched tight as a drumhead on the frame.

The wings, badly torn, but otherwise only slightly damaged, were repaired in the same manner and when the work was done the ace pronounced the glider as good as ever. "We'll have a few more days' practice with the glider and then I think we'll be ready for the sail plane wings. I know Ned and Richard can hardly wait. But in the meantime I expect we had better rig up a catapault of some kind, for we haven't quite the man-power to start a sail plane."

"There's Howard, the chauffeur, and Andrews, the gardener," said Mr. Jameson. "Will they be enough?"

Thunderation Elm

"We can try," was the answer, "but there should be six or eight to give a good start. The faster the take-off, the less the danger of trouble."

It was Ned who had a flash of inspiration. "Why can't we use our runabout to start the sail plane? One end of the rubber rope can be tied to the car and the other can be looped to the plane."

"My, he's becoming positively brilliant," observed Richard.

But Uncle Jim nodded in approval. "That's a capital idea," he said. "And we can use it to tow the plane back to the starting place. Wonder why we didn't think of it before?"

On the morning of the third day after the elm tree escapade, the long sensitive sail plane wings were put on the glider in place of the old ones. "It looks just like a huge swallow," said Richard. "I'll bet people will think it's a big bird when we go sailing overhead."

"It seems to me that our craft should have a name," said the elder Jameson. "Why wouldn't 'Swallow' do?" So the name was agreed upon and Uncle Jim promised he would letter the name on the nose of the plane that evening when the day's flying was over.

Ned got out the little runabout that had been given to them by their father the year before and towed the glider to the starting place. The prevailing winds were northerly, due to the way the hills lay in that part of the country, so the plane was faced to the northeast from which direction the wind was coming at the time. Ned ran the little car to the bottom of the hill, the rubber rope was attached, and the sail plane was ready to try its new wings.

As before, Uncle Jim climbed into the cockpit first. "I'll give you a little demonstration so you can see the difference between gliding and sail flying. And," he paused reflectively, "I can take one passenger. Ned, you thought of the idea of starting the plane with the runabout so I'll take you first."

Ned climbed into the front seat, his father steadied the wings, then Uncle Jim held up his hand for the car to start. Richard, at the wheel, drove swiftly forward, the rubber rope jerked taut and the sail plane shot high into the air like an arrow.

The wind whistled about Ned's ears and unconsciously he looked to see if the belt holding him to the seat was secure. Then the air about him grew calmer as the sail plane lost its momentum and began gently floating over the field in huge lazy circles. As they came southward over the cottonwood grove the ground seemed to sink away a hundred feet; they had struck the first of the upward air currents.

"I'm going to keep as near the field as I can," said Uncle Jim's voice behind him. Ned looked down. They were now over Thimble Mountain so he waved to his father and brother who stood looking at them curiously.

For half an hour the sail plane swung in spirals over the landing field, part of the time being nearly a thousand feet from the ground. Uncle Jim had taken advantage of every little breath of wind and undulation in the land to gain his altitude, but to the watchers below it seemed as if the sail plane were endowed with some silent miraculous power of its own that kept it in the air.

"I'm going to give them a little surprise," said Uncle Jim. "Just watch." With that the pilot pushed forward on the stick and the plane shot earthward with great speed. In a few seconds they were barely thirty feet from the ground, just above Thimble Mountain, and the elder Jameson and Richard made a wild scramble down one side to get out of the way. But the plane merely pulled up to an even keel and circled around to the south side of the hill until it was facing the wind. Then it glided gently forward and came to a rest on the very spot from which it had started, much to the amazement of the two spectators.

"So that's sail flying is it, Jim?" said Mr. Jameson. "It may be, but it looks a great deal more like magic to me!"

SAIL FLYING INCIDENTS

VI

IN THREE more weeks the Jameson family, with the exception of Abigail Abbott (who considered herself one of the family), became proficient flyers. Only once had Abbie been a spectator at the field, but the sight of the sail plane moving at a dizzy height over the tree tops had been too much for her and she had never appeared at the hangar again.

"Oh, Abbie," Richard said to her one morning, "if you'll just take a ride in the glider, I know you'll enjoy it."

"Now don't talk a lot of foolishness, young man," she answered. "The ground suits me very well. I'm just scared to death you're all going to break your necks in that awful flying contraption!"

"Well, why don't you let me take you for a spin in the *Red Eagle?"* asked Uncle Jim.

Abbie threw up her hands in despair. "Well, I never! You know very well that all the king's horses couldn't drag me into one of those things!"

Uncle Jim laughed and his blue eyes fairly twinkled. "Well, Abbie, maybe some day you'll change your mind." Then he turned towards the door, followed by the remaining members of the flying quartet. The day promised to be an interesting one, for the four had planned to visit a distant airport in the red monoplane.

"Oh, er, Mr. Jameson," Abbie suddenly added. "Will you please make sure you have a key to the house before you go to the hangar? I'm so afraid to stay at home by myself all day, and since you won't be back until late tonight I thought I would go in to town."

"Why, Abbie, what's the matter? No one's going to bother you. Besides, Howard and Andrews will be somewhere on the place all the time."

"I'm not taking any chances," she replied. "Mrs. Hinson just phoned that two jail birds escaped from the county jail last night. They're both murderers, and there's a posse of twenty men out looking for them. Isn't that just frightful?"

"Huh, what's that?" Uncle Jim looked up with interest. "Murderers? Escaped from the county jail? I say, Dick, there's an idea for you! Let's cancel that airport trip and go man hunting in the *Red Eagle* instead!"

"I'm with you. A man hunt always did appeal to me. How about it boys?"

"Suits me fine, Dad," replied Richard. "But why can't we have a little competition? You and Uncle Jim take the *Red Eagle* and Ned and I will take the *Swallow*. We can get Howard to give us a start. The winner can have the glider all day tomorrow."

"There's the sporting instinct of the Jameson blood cropping out for you," beamed their father. "We'll just take you up on it boys. But don't forget, the odds are against you because the big plane can cover more territory than the glider. I'll call Mr. Hinson, and get all the details before we start."

By the time the sail plane had been launched, with Richard at the controls, the *Red Eagle* was far out of sight.

It was a warm day and a good one for sail flying because

The Search

the excessive heat beating down on the hills and meadows promised many upward air currents to carry them on their way. The *Swallow* flew around the landing field in half-mile circles until it had gained a thousand feet in altitude. Then it began gradually increasing its radius so as to cover every acre of the surrounding country. Abbie had packed each of the flyers a small lunch so there would be no necessity for returning home before evening.

"If we can just keep our altitude," said Richard, "we'll be all right. It would be a lot of trouble to have to land somewhere and then tow the plane home for a fresh start."

Ned produced his field glasses and began to study the ground below. "I wonder what kind of place those men would be likely to hide in? Richard, where would you go if you were an escaped convict with a pack of bloodhounds and the strong arm of the law after you?"

"Gosh! I don't know! I believe if I were playing hide and seek with the law I'd find myself a nice thick patch of woods with a river flowing through it so I could catch fish when I got hungry."

"Or a cave hidden away some place where no one could find it. If I were a criminal, I'd find a place like that and hide a lot of things in it so if ever I had to do any escaping I'd have a place to go."

"Oh, murderers don't hide in caves anymore," said Richard, "because that's the first place people would go looking for them. People know where all the caves are by now. Gee, I'll bet those fellows got a good soaking in that rain-storm last night."

"It makes them safe from the bloodhounds anyway," answered his brother. "The water must have washed away the trail." Ned was silent for a moment, then he exclaimed, "If those men got wet last night they'd have a small fire somewhere so they could dry out."

"Naw, they'd be afraid to have a fire; somebody'd see the smoke."

"Not if it was a small one with a lot of woods around it," was Ned's retort. "The only place it could be seen would be from above."

"Now you're talking," said Richard. "Let's fly over all the woods and look for any sign of smoke. They'd be afraid to leave their hiding place today because they'd leave a trail in the wet ground. They may have stolen some clothes from some place so they wouldn't be recognized wearing uniforms."

"They didn't have uniforms, they were just caught the other day. The sheriff's description is that they were without hats or coats and were short dark men—foreigners."

The *Swallow* had by this time lost a great deal of altitude so Richard made for a hill on the far side of Hinson's woods where he succeeded in gaining a higher elevation by flying across it several times. "We've got to be careful not to be caught in any flat country," he said. "Guess we'd better stick to the hills and valleys so we won't have to walk home."

"Dad and Uncle Jim may have the advantage of us in some ways," said Ned. "But they can be heard a mile away. At least no one can hear us when we come sailing by."

"Yes, that's true," replied his brother. "And it's a big help. Tell you what, let's fly up and down Cripple Creek and examine all the woods along the way. Those men couldn't have gone far in that rain last night and Cripple Creek is the only large stream for five miles around." The county seat where the jail was located was just two miles from the Jameson place and the creek, which got its name from its vast succession of curves, wound around one edge of the town. The largest wooded sections lay on and near the Jameson property. The country on the other side of the town was nearly devoid of trees.

"It would be just our luck," said Ned, "if those men had picked out a nice dry barn some place and are sleeping up in the hay loft."

"The only thing we can do is to search the woods,' said Richard. "Hey, what's that smoke over there?" he pointed ahead and Ned saw a thin spiral of smoke coming up through the trees on one side of the creek.

"Do you s'pose that's the criminals?" asked Ned in an awed whisper.

Richard nosed the plane lower and sailed over the location in question. "I see two men sitting under a tree," said Ned. "I can't make them out clearly because there are so many branches in the way. Circle around and come over the same place again so I can focus the glasses on them."

Richard did as directed and again they glided over the spot, this time much nearer the tops of the trees because no helpful air current was close by to help maintain their elevation. Ned peered downward with the field glasses.

"Oh, it's only Howard, and the man with him looks like Andrews, Dad's new gardener. They played hookey and went fishing because they knew no one would be home to look after them today."

"Just our luck," said Richard. "But it shows one thing —that we won't be noticed by anyone in the woods. Howard and Andrews didn't even look up when we came by because we didn't make any noise."

"I'm glad these woods along the creek are not very wide," said his brother, "it wouldn't be very safe flying. We've got to get up higher, Richard, we're only a hundred feet from the ground."

"Well, I don't see any hills close by," replied the pilot, "and there's not a bit of wind. Looks as if we're going to have to come down."

Back of the gliders stretched the long fringe of creek woodland. Ahead and on each side for nearly two miles lay wide rolling pastures and fields of corn and wheat. The *Swallow* came closer to the ground each second and it seemed that an early landing would be inevitable. Another minute and her tail skid was actually brushing the long grass in a meadow.

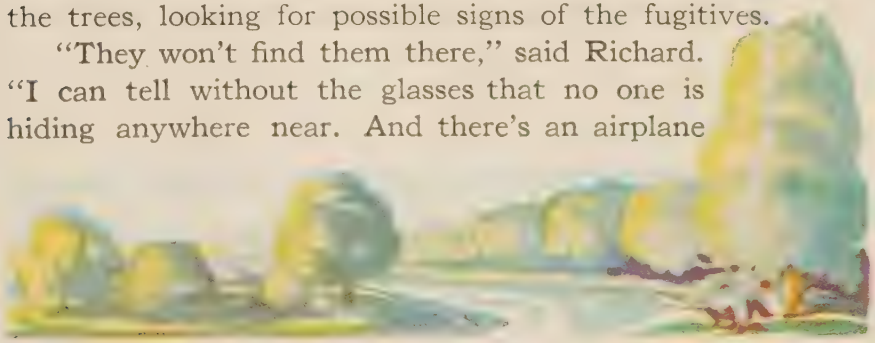
As is the rule in gliding, the unexpected is always happening. In this instance the unexpected came in the form of a sudden flurry of wind that came whirling toward them and lifted the sail plane fully fifty feet above the ground. Uncle Jim had taught them that these whirling eddys were caused by the uneven ground and crossing currents of air.

Swift as an arrow, the *Swallow* darted away on the very wings of the wind. In another minute a strong vertical column of air carried it upward again, and in a short time, by circling around and around, the sail plane had gained a high elevation. Below, the country lay like a vast map for many miles until it was lost in the haze of the distance.

"Now for the criminals, Mister Observer," said Richard. "You can't miss anything moving in those woods below, the trees aren't thick enough to hide all the ground."

"I see part of the posse!" Ned exclaimed, pointing to a cluster of trees around a small watercourse that ran into the creek. Five men were beating the low shrubbery around the trees, looking for possible signs of the fugitives.

"They won't find them there," said Richard. "I can tell without the glasses that no one is hiding anywhere near. And there's an airplane



ahead of us, but it's not the *Red Eagle* because it's painted silver. It must be someone else out looking for the murderers."

Ned studied the plane through the glasses. "No, it's a Ford tri-motored monoplane—a transport. I can tell by the shape of the rudder. Must be on that new air line they're putting across the state. Do you remember what Uncle Jim said about nearly always being able to tell the make of a plane by the shape of the rudder or design of the empennage?"

"Oh, yes, I know. The rudders on Fokker planes, like the *Red Eagle,* are rounded on top and overlap the tail fin. The Ford rudder is similar but the top is straight."

So interested were the boys in the transport ship ahead that neither noticed the approach of a large monoplane from the rear. It flashed past like a fiery streak, so close that the boys could distinguish the two men in the pilot's cabin who waved to them as they passed.

"Just look at them go," cried Richard. "Uncle Jim's tearing up the sky like a comet. They wouldn't be able to see an escaped jail-bird unless he happened to be running across an open field with a red flag in his hand."

"I wouldn't be too sure of that," said Ned, "Uncle Jim's had a lot of experience and if those men can be found I'll bet he can do it. The only way we can beat him is to figure out where they would be and get there first."

"All right, Mr. Sherlock Holmes, suppose you get that ponderous brain of yours working and tell me where to go."

Ned concentrated. For a long while he was silent, then he said, "There's just one place I can think of that no one knows anything about, and I believe it's the last place that anyone would think to look."

"You needn't tell me," his brother exclaimed. "I'll bet I know just what you're thinking about—that island—"

"Yes, that island in the creek where we used to go into the dugout to play Indian last summer."

Away to the west of Hinson's woods, where the creek

widened out over a waste of marsh and moor, there was a small rounded island, without vegetation except for a sparse growth of stubbly grass. In the center of this Ned and Richard had dug a round pit, several feet deep, and had covered the bottom with flat stones taken from the creek. The dirt from the dugout had been carefully deposited in the water and all evidences of their work had been camouflaged so that anyone standing on either bank of the creek could see nothing but a barren island. During the previous summer when the Jameson boys played "Indian" with neighbor children, they would roll their overalls up above their knees and wade the wide creek to their retreat. They had never been discovered.

The island lay two miles behind them, a mile beyond the landing field in a section seldom visited by anyone in the nearby homes. Richard banked the glider around and began zigzagging his way to the west, from one vertical air column to the next. They had a great deal of altitude to their advantage at the start and it was but a few minutes before they were over the marsh with its dwarf willows and spongy turf.

"Can you see the island well enough from up here?" Richard asked. "I'm afraid to get too low, because it would be a job getting the *Swallow* out of here if we had to land."

Ned was studying the dugout through the glasses. "They're there!" he exclaimed. "There are two men sitting on stones in the bottom! They haven't got hats or coats, and they look like foreigners. I don't see how they ever found the place unless they ran on to it by accident when they were crossing the creek."

"Let's get home in a hurry and try to locate the sheriff," said Richard. "It's nearly noon and he'll be coming back to his office."

Jameson Field was but a mile away, so Richard, having more than enough altitude to make the glide in one straight line, turned the *Swallow's* nose downward at a steeper

angle than before. And in a second the wind was beating against their faces and singing against the rigging as the sail plane gathered speed. It seemed but a minute before they settled on the bed of hay at one side of the field that had been put there by Uncle Jim's direction to lessen the shock of the glider's landings.

The boys were hardly out of the cockpit before they saw a group of men approaching from the cottonwood grove. It was the sheriff and part of his posse.

The men looked curiously at the motorless sail plane but were evidently too intent upon their quest to ask but a few brief questions. "Hello, young Swallows," said the sheriff, squinting at the name on the glider, "in your cloud-scraping this morning you didn't by any chance see a pair of escaped murderers, did you?"

"Yes, sir, we did!"

"Er—what's that?" The sheriff looked up in surprise and his men edged closer around the boys. "You say you've seen them—two foreigners—"

"Yes, sir," replied Richard, "we've been out looking for them all morning in our glider. They're over on—"

He was interrupted by the noise of the *Red Eagle*'s propeller and the group turned around to see the big monoplane skimming down the runway to come to a stop a hundred feet away. The elder Jamesons stepped out of the cabin and came running over to the crowd of men.

"We've found them, sheriff!"

Instantly the boys were forgotten. The men crowded around the older flyers, eagerly asking for directions. "They're over by the creek, just a half mile from here." Their father was speaking. "We saw smoke coming up through the trees and dove down to have a look. Two men, without hats or coats, were resting under a tree and when they saw us coming they jumped out of sight in the underbrush. There isn't any doubt but what they are the men because they were so anxious to keep from being seen."

Ned looked at Richard. They both grinned. No wonder the men were so anxious not to be recognized! Suddenly they began to laugh and for a moment the man hunt was forgotten.

"Here, what's the matter, boys?" asked their father.

"It's the murderers, Dad," said Ned. "I don't believe the sheriff would be satisfied with the ones you picked out for him. The men you saw were Howard and Andrews. They ran away and went fishing while everyone was gone this morning. That's why they jumped out of sight so fast when they saw the *Red Eagle*. We saw them too and flew down low enough to have a good look because they couldn't hear us coming."

Mr. Jameson seemed stunned. "I'll tend to them!"

"And Dad," Richard said, "we win the bet. We found where the murderers are hiding!"

Again Ned and Richard became the center of interest. Breathlessly, the men listened while the boys told of the dugout they had built, and how they had flown silently overhead and seen the fugitives inside.

No further time was wasted by the posse. Immediately Mr. Jameson and Uncle Jim were deputized by the sheriff and the party set out in the direction of the island. Ned and Richard were forbidden to go along and had to content themselves with listening to their father's account of the capture later in the day. The fugitives had been surrounded by the sheriff and his men, and being unarmed, were easily taken.

"Anyway," said Richard, "Ned and I can have the glider all day tomorrow."

AT THE FLYING CLUB

VII

IT HAD been more than a month since the event of the jail-breakers. The *Red Eagle*, a mile above the early autumn landscape, was swiftly droning her way eastward. Ned and Richard, comfortably seated on either side of Uncle Jim in the control room, were watching the ribbon-like roads and silvery threads of streams far below.

A happy summer was nearly at an end. A few more weeks and school would begin. But in the meantime there were days that held much in store for them; days full of adventure and interest. Uncle Jim was returning to his flying club to prepare for the cross-country race that would begin in two weeks. Their father planned to join them later and act as his brother's observer during the flight.

As the *Red Eagle* neared her destination the boys noticed that the country became more and more thickly populated. Occasionally they passed over large airports and once they made a landing at one to refuel.

Near by was one of the largest transport planes that either of the boys had ever seen. "That is a Fokker," said Uncle Jim. "It carries thirty-two people. The big biplane on the other side is a Curtiss Condor, an eighteen pas-

senger ship. Notice the three-blade propellers on each side of the fuselage. Propellers grouped in pairs always turn in the opposite direction from each other to neutralize gyroscopic force.

"Certain types of planes have a tendency to stall when the pilot attempts too steep a climb. He goes into a tail spin and crashes to the ground if he is not high enough. To prevent this, Hanley-Page, an English aircraft designer, invented 'slotted wings.' These are small wing sections that fit into the leading edge of the upper wings on biplanes, near the tips. They appear as part of the wing when the ship is in flight, but when the ship begins to stall, these slotted wings are automatically raised upward and catch the air, spreading it out evenly over the wings so the ailerons will work. In a stall the ailerons are limp and have no effect on the movement of the plane."

When the *Red Eagle* was again on her journey, Uncle Jim continued his talk. "I believe the most interesting advance in aviation is the 'flying windmill' or autogiro. You've both seen pictures of it, and in fact some members of the club have been experimenting with one. The monoplane wings are very small, but directly over the cockpit is a huge rotor, like an oversized four-blade propeller. The aerodynamics are a little hard to understand. This rotor is tipped slightly backward from the angle of flight and when the machine goes forward, the wind makes the rotor revolve. When the ship slows down in the air it doesn't stall as other planes would. Instead, as it starts to sink, the air catches the rotor from underneath and causes it to revolve around quickly and the plane settles slowly to the ground in almost a straight line. The action of the rotor does away with many of the hazards of flying and gives the autogiro the remarkable ability to land in only a few feet of open ground."

For a while Uncle Jim let each of the boys take the controls. It was great fun to feel the powerful ship respond to the slightest touch. They were taught to watch the com-

pass to see that the eastward course was kept, and to pay careful attention to the turn and bank indicator and the inclinometer. The former was a small needle operated by a gauge similar to a spirit level that showed if one wing were higher than the other. The inclinometer was much like it except that it showed the pilot if he were going up or down. After a half hour of flying Uncle Jim had them read the drift meter and set the ship back on its proper course.

Uncle Jim during the war had held a captain's commission. Although Ned and Richard had never heard him spoken of as "Captain Jameson," the term still clung to him in flying circles. As they learned later, the members of his club, of which he was founder and president, called him by the affectionate title of "Captain Jim."

That night when the *Red Eagle* landed in the brilliantly lighted field of the flying club, her propeller had hardly ceased turning before she was surrounded by a host of mechanics, assistants and attendants. "Hello, Captain Jameson," they greeted. "Have a good trip, sir?"

It was a different world from any the boys had been in before. Here, their uncle was known to everyone and Captain Jameson was a figure loved and respected by all. It was a world of aviation where men were as much at home in the sky as on the ground.

The day after their arrival Ned and Richard were taken for a visit through the airplane factory of which Uncle Jim was part owner.

Most factories are crowded, smoky, bustling institutions where men and machines do their utmost to turn out the greatest possible number of articles in the shortest possible length of time. The airplane factory is different. The

workmen are experienced men, who realize that the slightest flaw may mean a serious mishap and loss of life. Of the thousands of different pieces that go into airplane construction, each is most carefully made and tested before it finds its place in the finished ship.

In one section, Uncle Jim showed them where the duralumin tubing, that has taken the place of wood in airplane manufacture, was being cut and welded together to form the fuselages. In another section, workmen were welding the spars and ribs for the wings. Some of the wing sections were made of both metal and plywood for different types of planes. Duralumin, or "dural," as Uncle Jim explained, is the lightest and strongest metal for its weight known to science. It is an alloy of aluminum and other metals having the strength of steel with one third the weight. Its use in recent years has made possible larger and more powerful planes than the early pioneers of aviation ever dreamed would be possible. The DO-X, giant flying boat designed by Dr. Maurice Dornier of Germany, carrying a hundred passengers and a crew of fourteen, is constructed of duralumin.

In still another department, the wing sections and fuselages were being covered with airplane linen and given their coating of dope. This is a kind of varnish made of a compound of cellulose. When dry it forms a layer of celluloid on the covering and makes it shrink on the frame. Afterward the covering is varnished with several coats of true varnish and it becomes airtight and waterproof.

"The engines and propellers," said Uncle Jim, "are made by other concerns who specialize in their manufacture. The radial engines used here are like the one on the *Red Eagle*. They require many weeks in their making and are tested for days before they are allowed to leave the factory. Each engine is mounted in a separate room by itself, a short propeller is attached and it is allowed to run for hours at high speed. After this it is taken entirely apart

and examined for flaws. Then it is put together and allowed to run for a long time again before it is pronounced perfect."

"What is the difference between a radial engine and a rotary engine?" asked Ned. "They both look the same."

"A radial engine is a development of the rotary," said their uncle. "In the rotary engine, the cylinders revolve around with the propeller. They were used a great deal during the war because of their lightness and power. Since the radial engine has been developed, the rotary has gone out of use. In radial engines the cylinders are stationary and more power is developed."

Back at the club the boys were shown through the long hangar where the members kept their planes. Practically every type of plane was represented. The landing field bordered on a large river and a separate hangar by the water housed the seaplanes and amphibians.

"The *Red Eagle* is being conditioned for the race. The motor has to be overhauled after every three hundred hours of use and all worn parts replaced. It isn't like an automobile: an airplane has to be in perfect condition all the time.

"Would you like to go for a flight in an amphibian?"

Uncle Jim led them to the waterfront hangar. At his command a large Sikorsky amphibian, moored to a low pier on the water, was conditioned for flight and the three stepped aboard into the luxurious enclosed cabin. In a minute the two sturdy engines with their three-blade propellers were driving the plane over the water. A few more seconds, and they were in the air.

"Why do you call some ships seaplanes and others amphibians?" Richard asked.

"A seaplane always takes off and lands on the water, an amphibian is equally at home on either land or water. There is a small seaplane taking off below us. It's a supermarine Napier, the fastest plane in the club. Watch! it'll be flying circles around us before we've gone half a mile."

Uncle Jim was right. While they watched, the little craft came tearing past them like a dart. Cutting to the

right in a steep bank, it whirled around until it was behind the big amphibian and then came zooming upward over their heads at more than twice the speed of the Sikorsky.

"Whew! that looks thrilling," gasped Ned. "I didn't know a seaplane could travel so fast."

"Some types of seaplanes are much speedier than land planes," said Uncle Jim. "The reason is that it is dangerous to land a high speed ship on the ground. An extremely fast plane has very small wings to cut down wind resistance. The heavy engine necessary for great speed adds a lot of weight to the fuselage. Small wings have little lifting power and the result is that these fast ships cannot land safely as their landing speed is too high for a small field. However, water acts as a shock absorber, besides affording unlimited space in which to land. Some seaplanes have a speed of more than three hundred and fifty miles an hour. It won't be long before they'll pass the four hundred mark."

As Uncle Jim brought the big Sikorsky back to the club, a small monoplane appeared alongside and its pilot waved a greeting to the occupants of the larger ship. "That's Gordon of the club flying his Morane-Saulnier parasol. He's entering his Lockheed in the race and I expect pretty stiff competition from him."

"Why do you call that monoplane a parasol?" asked Richard.

"In a parasol the wings are raised above the fuselage which is suspended to it from struts."

Later, at the club, the boys were taken into the test room where beginners are examined for their flying ability and experienced pilots tested for their efficiency. "Would you like to take a ride in the orientator?" asked their uncle. "I'd like to find out what kind of pilots you'd really make. We can give you all the simple tests and find out if you should really go ahead with aviation."

"Really, Uncle Jim? Will you do that?" Ned and Richard exclaimed eagerly. They both knew that good pilots had to have what their uncle termed "inherent fly-

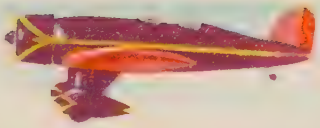
SIKORSKY AMPHIBION

ing ability," the ability to act and think quickly in the air at all moments. Most people can learn flying, but when there is some small defect of eyesight or balance, their chances of success are small. Here at last was a chance to settle the all important question that had been constantly on their minds since they first rode in the *Red Eagle*.

First came the orientator. It was a peculiar machine with a cockpit like that of an airplane built within three revolving rings. These were set in motion by Uncle Jim who sat in a chair on one side of the room with regulation airplane controls fastened to a base in front of him. Uncle Jim would work his controls in directions that in real flying would result in the ship being thrown into a tail spin, a turn or a loop. As he did so, the rings would whirl around and the cockpit would assume the same position that would be taken by the plane. The boys had to manipulate the controls in the cockpit and bring the orientator back to a normal position.

It was harder than they expected. The orientator seemed to have a mind of its own, for seldom would it revolve to the desired position. Once Ned lost control, and consequently all sense of direction, and he ended his wild ride in the revolving rings by hanging, head downward, from the seat. Only the stout cotton belt around his waist kept him from falling to the floor.

Ned was rescued amid much laughter and Richard took his place in the cockpit. He met with somewhat better success but Uncle Jim could only shake his head sadly and remark, "Your gliding hasn't helped as much as I had hoped. I would never trust either of you up in a storm unless you learn to do better than this. Hereafter, both of you practice a bit in the orientator every morning."



LOCKHEED SIRIUS

Ned and Richard felt crestfallen, but they resolved to do their best at the remaining tests. After the usual examination of reading printed cards at certain distances, which they passed without trouble, they were led to an oblong black box to test their depth perception.

"A lot depends on the outcome of this," said Uncle Jim. "You can try it three times, and if you fail the third time,—" Uncle Jim shook his head sadly as before.

The box was lighted from within so that no shadows were cast in any direction. Inside were two upright sticks, one stationary, the other on a slideway with strings leading through the front of the box. In the fore end was a small window. In turn the boys were seated twenty feet away, given the strings, and told to pull the movable stick until it was on a line with the stationary one. Though it looked easy, they found it a very difficult thing to do. Their first tries were failures, but in the next two attempts they came close enough to win their uncle's approval.

The high altitude test was an unpleasant one. It consisted in breathing through long tubes connected with an intricate machine back of them. At each breath, the air became thinner, comparable to the air at high altitudes. The club doctor kept careful check on the heart as each boy took the test. When they were through he said, "I think you'll be quite safe in the air. Go as high as you please. You've both been active and lived out of doors, and that makes a big difference."

"Now, boys", said Uncle Jim, "except for the orientator, you've done very well so far. But there are two very simple tests left to take. A great deal depends upon them."

The first was an equilibrium test. The boys stood perfectly straight and still, bent one knee, and closed their

eyes. They were to hold this pose for sixteen seconds. It sounded surprisingly simple, but it was a test that required perfect balance for anyone to do well and not move before the time limit was up. By the count of ten Ned was beginning to wobble alarmingly, but Richard was perfectly still. At the count neither boy had moved, though Ned was nearly ready to give up.

"The original equilibrium test was given in a whirling chair," said their uncle, "but its use has been discontinued in favor of the more simple one. Next, and last on the list, you will be blindfolded and we'll see if you can walk the length of the room in a straight line. Don't be surprised if you end up in a corner some place or under a chair; though if you do, you'll never grow up into regulation aviators."

In turn they were blindfolded and each walked down the long white line painted in the middle of the floor. And in turn, each was not so greatly surprised to find that he had traversed the length of the room without once stepping off the mark!

"That's better," said Uncle Jim. "But don't feel set up too much over it—if you hadn't walked that line to the end, I'd have felt like paddling you both!"

With so many things to do, time passed quickly at the flying club. It was the day before the race and Ned and Richard were sitting in the observation tower, watching the planes taking off from the field below. Unnoticed, their uncle appeared, in his hand was a telegram.

"I have just received word from your father that he will be unable to be here in time for the race tomorrow." Here he paused, and his eyes twinkled as he asked a question that required no answer. "I have to take some one

with me. Would you boys like to come along?"

For a moment they were speechless with surprise. Then gaining their voices they shouted with delight, "Uncle Jim! Really—can we? Do you—"

"Just a minute, now," replied the aviator. "First we must have your father's consent. I'll wire him immediately."

Down stairs the three of them rushed, and in less than a minute they were in the telegraph room of the club. "How long do you think it will be before we hear from Dad?" asked Ned after the message had been sent.

"Perhaps an hour, possibly longer," replied Uncle Jim. "It depends entirely on where he happens to be when the message arrives."

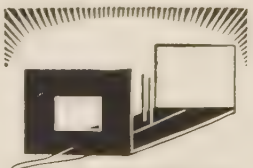
Ned and Richard went back to their seats in the observation tower. They tried to become interested in the activities in the field below, but for some reason the place had suddenly lost its glamour. Forty minutes had hardly passed before they were back in the telegraph room.

"No," replied the clerk, "there has been nothing yet from Mr. Jameson."

Disappointed, the boys turned away and went off in the direction of the hangar where the *Red Eagle* was receiving her finishing touches for the race on the following day. "Gee, I hope Dad's in a good humor when he receives that wire," Richard murmured. "He's always been nice about things, but maybe he'll be afraid to let us go with Uncle Jim tomorrow."

"Aw, stop your worrying, old Gloom. Didn't he let us fly all the way here to the club?"

"Oh, I'm not worrying, Ned. But what're we going to do if Dad's away from home?"



DEPTH PERCEPTION APPARATUS

"Gosh, I didn't think of that! Aw, come on, let's do something. We'll hear from him for sure before night."

Night came, but no message had been received from their father. They could wait no longer, so the two went to Uncle Jim with their troubles. "Suppose we don't hear from Dad at all, Uncle Jim," said Richard anxiously.

"I'm sorry, boys, but it would be best to have your father's consent if you fly in the race tomorrow. There is always some risk when a plane is going full speed for any length of time, and there can be no stops on tomorrow's flight. Now, forget your worries, and go to bed early so you'll have a good night's rest. Perhaps there'll be a wire from your father in the morning."

The next morning the boys rose early, but though they waited until long after breakfast, the expected message had not arrived. To add to their dismay, Uncle Jim was not to be found.

The time for the race drew near. Mechanics and assistants were pulling the planes to their positions on the starting line and the air was alive with the noise of motors being tuned for the flight. A crowd had gathered.

Ned and Richard despondently watched the great planes beyond the ropes. "I don't see the *Red Eagle*," said Ned.

"There it comes now," cried Richard. "It's at the end of the line. Hurry!" The boys ducked under the ropes and began to run in the direction of the ship.

"Hey! Get back there!" cried a vigilant policeman guarding the lines. "What do you kids think you're doing?"

They stopped. Ned tried to explain but could only stammer disappointedly.

"It's all right, officer, let them through," said a familiar voice behind them. "They're with me."

Uncle Jim appeared. "I've had a time finding you young rascals," he explained. "But I've decided to chance it and take you with me anyway, even though I haven't heard from your father. Better hurry. The race begins in five minutes!"

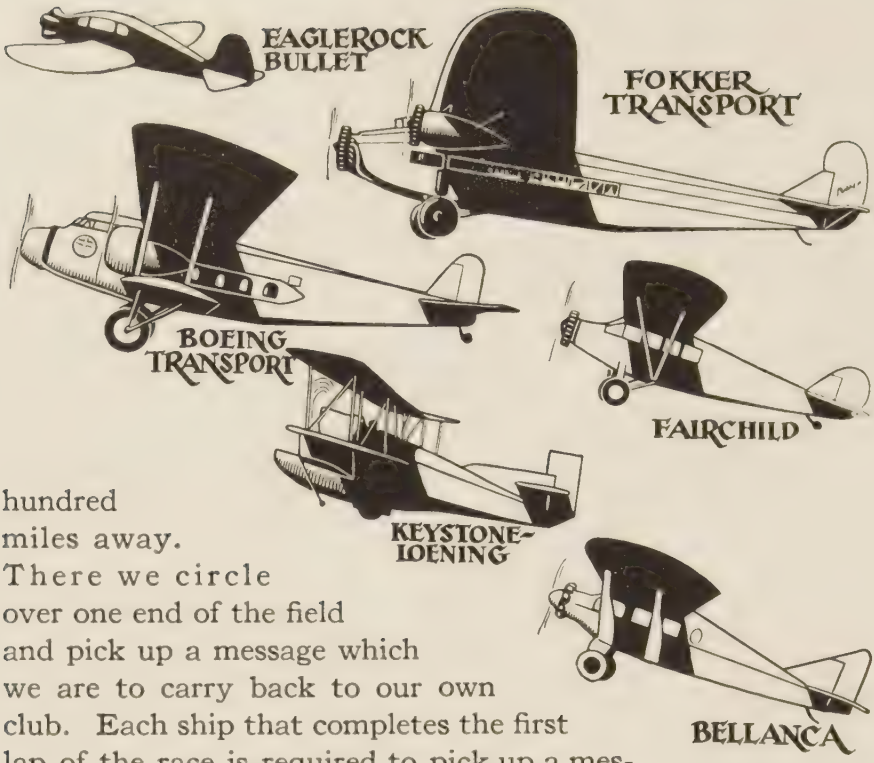
THE RACE

VIII

MECHANICS rushed frantically about, engines roared, spectators cheered from the crowded observation platform and sidelines. Biplanes and monoplanes, Wrights and Ryans, Fords and Fokkers, Curtisses and Keystones, twenty altogether, in one long line stretched across the wide field. In the tower a man waved a red flag and simultaneously came the flash of the signal gun for the start. The class A entrants shot down the field and took to the air. The cross-country race had begun!

The *Red Eagle* was among the last to leave the ground. A cowling over her radial engine had somewhat altered her appearance but had added to her speed. The cabin had been stripped of everything unnecessary for the flight to cut down all surplus weight. Trimmed and groomed to the last detail she appeared like a flaming dart in the sky.

"Our ship is not the fastest in the lot," said Uncle Jim, "but I do believe it's the most dependable. And we have another thing in our favor; not one of the other pilots has had much experience in cross-country flying, while I've flown over the same route many times before. The first lap of the race is westward to another flying club, seven



hundred miles away. There we circle over one end of the field and pick up a message which we are to carry back to our own club. Each ship that completes the first lap of the race is required to pick up a message and bring it back to his own field."

"We'll have to land to get the message, won't we?" asked Ned.

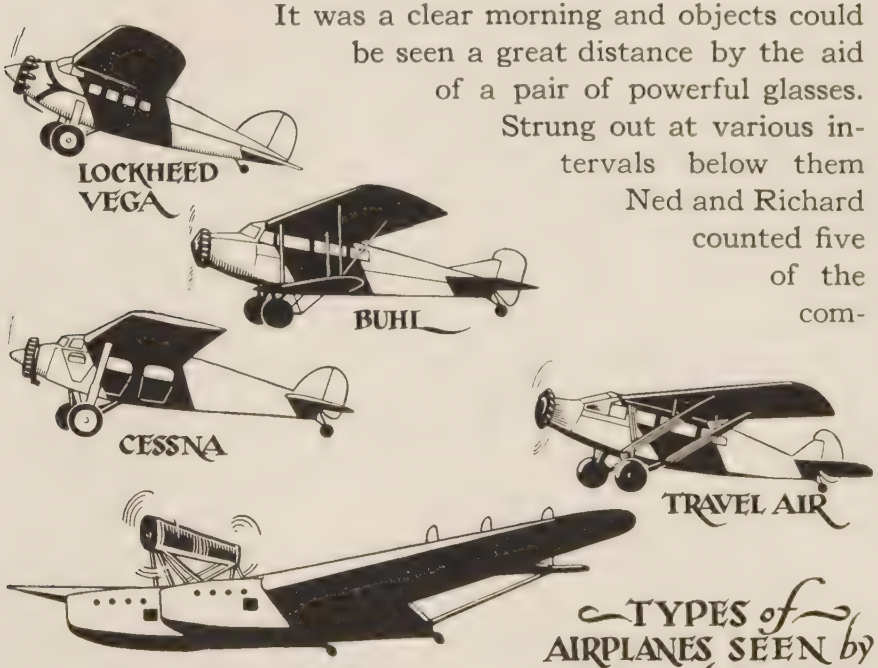
"Oh, no, we'll follow the example of the air mail. The message will be suspended between two poles. All we have to do is to lower a small grappling hook through the trap door in the cabin. I'll fly low over the field, between the two poles, and catch the bag. Then you and Richard can pull it up into the cabin. All the other flyers are equipped the same way."

Gradually, after some of the weight of the gasoline had been consumed, the *Red Eagle* sought a high altitude. At eight thousand feet Ned and Richard noticed a popping sensation in their ears that reminded them of their first mountain climbing experience. Fascinated, they watched

the altimeter. Ten, twelve, fourteen thousand feet; higher than they had ever been. The air, though easier to breathe, required greater expansion of the lungs.

"The higher we go," said the pilot, "the faster our speed will be, because there will not be the resistance found in the heavier air of lower altitudes." As the altimeter reached eighteen thousand feet, Uncle Jim leveled the plane off and flew in a straight course toward their goal. In an open plane, the extreme altitude would have required the use of heavy, padded suits and possibly oxygen tanks. However, the boys found the enclosed cabin warm and comfortable, though at first they felt dizzy in the rarefied air. After an hour they became used to it, and finding the use of oxygen unnecessary, amused themselves watching the landscape nearly three and a half miles below.

It was a clear morning and objects could be seen a great distance by the aid of a pair of powerful glasses. Strung out at various intervals below them Ned and Richard counted five of the com-



TYPES of AIRPLANES SEEN by NED and RICHARD at the FLYING CLUB

peting planes, two of which were slightly in advance of their own plane. Miles back of them, in miniature, were the slower planes.

The earth presented a totally different appearance at eighteen thousand feet than it had at lower altitudes in which the boys had been accustomed to fly. No longer were people and automobiles visible; even the houses seemed to have melted away into obscurity. Only the roads, like finely scratched pin lines, and the vari-colored sections of farm land showed the handiwork of man. It was a vast, softly tinted mosaic, that seemed to stretch below them forever.

"Ned, if you'll relieve me at the controls for awhile, I'll do a little observation work," said the pilot. Ned relinquished his seat at the window and handed his uncle the glasses, only too glad for a chance to run the ship in a race.

Uncle Jim studied the craft below. "It's just as I expected, Gordon's Lockheed is in the lead. And directly below is McDonald's Bellanca. They're both sticking close by us to follow our route. We'll have to give them the slip somehow and let them do their own navigating. The amphibians are doing rather better than I thought. The Sikorsky is ahead, but the Loening and the Moth are not far behind. I don't believe they'll hold their pace for fourteen hundred miles, in spite of all the interior remodeling they had to do to carry gas for the trip. There's a Savoia-Marchetti amphibian bringing up the rear, and just ahead of it is a Travel Air cabin plane."

Uncle Jim was scanning the ground below for signs of other planes. "There are a few more I missed, they're flying so low I couldn't see them at first. They're under that layer of small clouds. There's a Cessna at about a thousand feet, and strung out behind is a Vaught and a Fokker amphibian. I believe the only ones we have to fear are the Lockheed, the Bellanca and the Cessna."

For another half hour they roared along and then to

the occupants of the *Red Eagle* it seemed that they were slowly creeping ahead. "You're going to see some climbing in a minute," said Uncle Jim. He was right. The craft below began to seek a higher altitude and in a short time they were traveling only a few hundred feet below the red plane.

"Why, how did you know that?" asked Richard, surprised.

"That's easy, they know my top speed is no faster than their own. The only reason why we could be leaving them behind is we're in a swift air stream moving in the direction of flight. The cowling over the motor has cut down wind resistance a great deal and added ten to twelve miles an hour to our air speed. The air current we're in is moving about twenty-five miles an hour, so altogether, our ground speed is about two hundred and thirty miles an hour."

Ned gasped. "Gee, that's fast enough for me. An auto'll seem tame after this."

Ahead of them loomed a great bank of clouds and mist that seemed to pile like phantom mountains for thousands of feet above their present altitude. "Looks pretty bad," said Uncle Jim, "but it'll make an opportunity for us to give the rest of the bunch the slip. Better give me the controls, Ned."

Uncle Jim banked the plane to the left and flew several miles southward before he entered the cloud area. The

other planes followed his lead and soon they were all enveloped in the ocean of clouds. The ground disappeared from below and it seemed that they were moving in a vast realm of eternal mist. Occasionally they would come out into an open area and the clouds below them looked like a fairy sea of silver and white.

"Now is the time to work my little trick," said the pilot. When the rest of the planes had disappeared in the obscurity around them he dove earthward for a mile and then resumed the westward course he had plotted on the small map carried in a frame below the instrument board. "If I'm not mistaken, the other flyers will be far to the south of us when we strike open sky again. It's time they learned to do a little navigating on their own part."

A half hour later they passed the cloud area and came once more into the sunlight. The end of the first lap was now only an hour's flight ahead. "I'm not going to climb again," said Uncle Jim, "because the air is thickening up a lot and I'll have to keep dropping closer to the earth all the time in order to make out the landmarks. I'm afraid we're going to have bad weather on the way back. See any one coming?" he added suddenly.

Ned and Richard examined the cloud bank to the rear. "Not a sign," was the answer.

A few more minutes went by. "Take another look," said Uncle Jim, "I've an uneasy feeling that someone's on our trail."

Richard took the glasses. "You're right," he exclaimed, "there's a plane just coming out of the clouds now. It looks like the Lockheed."

"Here, take the stick, Richard, let me have a look." Uncle Jim studied the plane carefully. "It's the Lockheed all right; just five miles behind us. She's coming like the wind. Give her the gun, Richard, it's going to be a race to the finish."

Richard pushed the throttle forward to the last notch. "Gordon's slowly gaining on us," continued Uncle Jim,

The Storm

"but I believe we've enough leeway to make the first lap ahead of him. If we can just get the first message bag, he'll have to wait a few minutes before they can rig a second bag up on the poles. That should give us a ten mile start on the second lap. Let me have the stick now."

At the end of thirty minutes the flying club could be plainly seen ahead; the Lockheed was only a few hundred yards behind. "Open the trapdoor and drop the hook," Uncle Jim commanded. Ten minutes went by. The *Red Eagle* dropped earthward; the Lockheed only a length in the rear. Then Uncle Jim dove straight for the two poles at one end of the field, at the same time easing back on the throttle to cut down his speed. He could take no chance on breaking the cable in the terrific jerk of the hook as it clutched the loop to which the message bag was attached.

His aim was sure, the hook struck the loop fairly in the center and as the *Red Eagle* shot upward again amid the cheers of the waiting crowd below, Ned and Richard hauled the bag safely up into the cabin and closed the trapdoor. "Congratulations, Captain Jim," cried Ned. "You win the first lap."

Captain Jim beamed happily and whirled the plane around in a dizzy bank to the east. "If we can just make the second lap—" he said.

The *Red Eagle* streaked out for her home port, a strong ground wind adding to her speed at a seven-hundred foot altitude.

"I'm beginning to be worried about the weather," said the pilot. "Just take a look at the sky."

The boys had been looking. Overhead the sky was gradually turning a dangerous copper color. Ahead of them reared a great mountain of black clouds that stretched far away to the right and left.

"Looks as though we're going to be caught between two storms," said the pilot. "We'll run into one if we climb, and there's one about to break ahead of us. When they meet there's going to be the dickens to pay. I wish we were

a few miles up above it all. At fifteen or twenty thousand feet, the air is too thin for violent disturbances."

"Can't we go around it?" asked Ned.

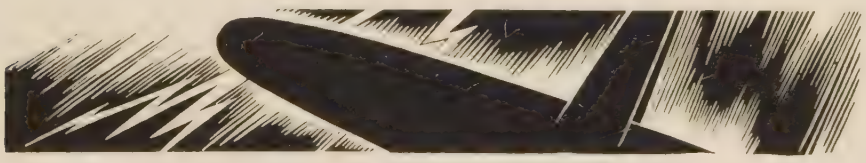
"It would take us hours to make it and our only chance of winning the race is to keep on a straight course. I believe the only thing to do is to get as high as we can before the storm breaks. If we can reach ten thousand feet before anything begins to happen, we'll be all right."

It was now pitch dark outside and low rumbles of thunder were heard. Tensely, the three occupants of the red plane watched the altimeter as it slowly climbed from seven hundred feet to fifteen hundred. Three thousand feet brought no relief. Instead, the sky seemed blacker than ever and a violent, twisting wind had arisen. At five thousand feet Uncle Jim began to look worried. "This is a freak storm," he said. "It seldom gets so bad this far up."

Lightning began to flash around the ship and the thunder increased until it seemed as if there were cannonading on all sides.

Suddenly the storm broke. With the fury of a thousand devils it bore upon them. Violent flashes of lightning streaked across the black void without. Wind and rain beat upon the ship, tossing it around like a feather. Then came one frightful, rending peal of thunder, as if the very worlds of the universe had collided and ground themselves to destruction.

Uncle Jim groaned, and as Ned and Richard turned to look at him, he slumped forward in his seat and fell inert upon the floor. The *Red Eagle*, released of its guiding hand, slipped sidelong into the rush of wind, and went reeling in a sickening tail-spin toward the earth, nearly a mile below.



THE EMERGENCY TEST

IX

NED CLUTCHED wildly at a supporting strap overhead. Richard, thrown against the control seat, tried to reach a rudder pedal with his foot. "Uncle Jim!" he cried, "Uncle Jim! what's the matter?" There was no response. Desperately he began pulling the limp form to one side, but the downward course of the plane made it an impossible task.

Suddenly Ned turned loose the strap and fell down beside his brother. Between the two of them, Uncle Jim was moved and Richard slid into the pilot seat, kicking the right foot pedal and moving the stick into opposite control. The rudder, cupped to one side to catch the wind, stopped the whirling course of the ship, in a moment the elevators took effect and Richard brought the *Red Eagle* to an even keel. A half minute later and the *Red Eagle* would have been a mass of twisted wreckage on the ground.

"Ned, look after Uncle Jim. It's all I can do to manage the plane." Flying in the darkness without even a sight of land to restore one's sense of equilibrium and direction is difficult, even for the most experienced flyer. Add to it a storm and terrific wind and it becomes a life and death

struggle, with the odds in favor of the elements. Richard had no time to think of the dangers around him. Constantly watching the needle of the turn and bank indicator and the inclinometer, he managed to keep the *Red Eagle* on a nearly even keel, at the same time steering east by the aid of the compass.

In the meantime, Ned produced a canteen of water from their untouched lunch and bathed Uncle Jim's face and hands.

"He—he's not dead," gasped the boy. "His heart's beating. What do you think is the matter, Richard?" But his brother was too busy to answer, so Ned managed to pull the aviator down into the main cabin and braced him in the center of the floor with cushions, one under his head and one at each side to prevent him from rolling as the ship pitched in the wind. Then kneeling beside him, he began rubbing his wrists to restore circulation.

It seemed hours to Ned and Richard before the storm had begun to wear itself out and the sky became lighter outside. They had really flown through the worst of the storm area and little more than half an hour had passed by. Soon the ship steadied and settled into its accustomed pace, and now Uncle Jim had opened his eyes. But it was several minutes before he spoke.

"Rather a nasty little thing for me to do," he said at last, very weakly,—"to fail in a crisis like that."

"Are you all right, Uncle Jim?" cried Ned. "What's the matter, are you hurt?"

"I'm all right, son," said the flyer slowly. "But I'm paralyzed—I guess. The ship—the storm—how did you get out of it?"

"Richard did it. We went into a tail-spin when the storm hit us, but Richard reached the stick in time and brought us out."

"Good for both of you. No one could have done any better." He was silent for a minute, as if talking were a

great effort. Then he said, "Ned, see if you can help me over to a seat beside Richard. I can hardly move by myself."

Ned did as he was directed, and with considerable difficulty and exertion, Uncle Jim was finally dragged to a seat on the left side of the controls and propped up with cushions so he could watch the instrument board. "Brave boys," he said. "There isn't any doubt of your flying ability now."

After a while he gained strength and his voice was more normal as he spoke. "Richard, after Ned has rested a bit, let him take the stick, you've had a hard go of it and it's time you relaxed a bit.

"During the war," he explained, "I had a nasty case of shell shock. It was a week before the Armistice was signed. I was coming back to our own lines after patrol duty when the enemy started a heavy barrage on our flight headquarters. Just as I cut off my motor for a landing, a shell burst directly overhead. Though I knew nothing about it for four days, the concussion must have been terrific, for it blew most of the plane to bits. Why it didn't kill me I don't know, but it only nicked me in places."

"That's what caused the scar on your cheek, isn't it?" said Richard.

"Yes, that's one of the scratches I got. Well, it left me paralyzed for a long time, but I finally recovered and the doctors pronounced me as good as ever." Here he smiled. "It seems though that the doctors were wrong; just look what a bit of thunder has done!"

Ned shuddered. "That was the worst crash of thunder I've ever heard."

"Yes, and the trouble was we were right up in it and caught the full shock. It wouldn't have been so bad on the ground. I'll be all right in a few days; the shock was what did it."

Every half hour Ned and Richard exchanged places at the controls. Uncle Jim directed the flight of the plane while one of the brothers described the landmarks below.

Aerial navigation under such circumstances was difficult, but the injured flyer managed to keep the *Red Eagle* on her proper course by checking up the description of the country with the map before him.

Of the other planes, nothing was to be seen. Either they had drifted off their course or had been forced down by the storm. There was even a possibility that some of the faster ships were now in the lead, well on their way to winning the race.

Weather conditions were against the flyers. Although the sky was clear, they were traveling against a thirty-mile wind. Several altitudes were tried in the hope of finding a favorable air current, but all to no avail for they had to remain near enough to the earth for the boys to recognize the landmarks.

"I hope we can make it back to the field before dark," said Uncle Jim, late in the afternoon. "If my calculations are correct, we can do it. Richard, there should be a large lake ahead somewhere. It has an island at the north end."

"There are several lakes in front of us," answered Richard, "but I think I see the one you mean. It's the biggest one, and there's an island in it, just as you said."

"Good. That means we are less than an hour from the flying club. We'll get there before sundown."

A half hour later the boys noticed a small group of airplanes approaching them. In the lead was a swift flying boat and in squad formation behind were the smaller planes that had not taken part in the overland race. Soon they neared the red plane, where the squad divided, and with three ships on either side they began flying back with the *Red Eagle.*

"Looks as if we are one of the prize winners," said Uncle Jim. "That's better than I even hoped for. I expect Gordon got in first with his Lockheed. The club made arrangements to have the winners escorted back to the field."

It was not long before the landing field of the flying club

came into view. A few minutes more and Ned, who was taking his turn at the controls, would be called upon to make his first landing in a motored ship. He was thankful for the many hours practice the glider had given him. Take-offs and landings are the most hazardous parts of piloting. Ned was well aware of this and silently prayed that he might accomplish the feat with no ill results.

"Richard," said Uncle Jim, "see if you can hold me up some way so I can have a look at the ground. We've got to be careful for the next few minutes."

Richard put his arm around his uncle's shoulder and managed to raise him to a sitting position so he could look through one of the windows. "I know I'm heavy, Richard, but it'll only be for a few minutes."

"Slow down a bit, Ned, and push forward on the stick—a little more. There—hold it a bit. All right, cut off your switch, we're low enough now."

Ned did as he was told and the *Red Eagle* began gliding toward the field.

"Now—level her off, back on the stick." The plane's right wheel and tail skid touched the ground first but in another moment she was rolling evenly across the field despite the two point landing. The plane slowed up, Ned applied the brakes to the wheels and they came to a stop, just as a great crowd rushed forth from the sidelines and closed in upon the flyers.

As Ned and Richard opened the door of the fuselage, a great cheer went up from the crowd outside. The first person they saw was their father, who seized them one after the other in his big hands and raised them to his shoulders. "Congratulations!" he cried. "The *Red Eagle* wins first place!"

THE *RED EAGLE II*

X

WHEN THE reporters heard the thrilling story of the *Red Eagle*'s flight and the battle with the storm, the Jameson boys became momentary heroes. Uncle Jim was borne away on a stretcher in the hands of his friends and in a little while the club doctor, talking through the loud speakers on the observation tower, announced to the crowd that the flyer's condition was not serious and that he would be well in a few days.

"You didn't get Uncle Jim's telegram asking if we could fly with him in the race, did you, Dad?" asked Richard.

"No," replied his father, "and it's probably a good thing I didn't. If I had received that message, I'm sure I should not have given my consent for you to go with him. As it happened I was on the train on my way here, and I had no idea you had gone with Uncle Jim until I arrived at the club this afternoon."

For a full minute their father stood with his face turned away from them; then his hands rested warmly, one on each boy's shoulder. "You've saved your Uncle Jim's life, and your own too. If anything . . . but that's all over now. And I guess there'll never be any objection to any aviating you boys want to do."

The boys laughed, a bit embarrassed by their father's emotion. And then, they started across the field together to "have a look at Uncle Jim."

A week later, the excitement of the race was beginning to wear itself away and Ned and Richard went home with their father. Before they left, Uncle Jim had improved greatly and was able to walk around with the help of a cane. "You can look for me at Jameson Field in a few more weeks," he had said. "I'll be as good as ever by that time."

The news of the Jameson flying field, along with newspaper accounts of Ned's and Richard's flight, had spread to the nearby town and surrounding farms. Every day a small crowd collected near Jameson Field to watch the sail plane make its mysterious flights in the air.

Ned and Richard were in the observation tower of the silo, idly watching their father soaring overhead in the sail plane. High in the heavens, the first great triangle of wild geese was moving southward to escape the early frosts in the far north. The leaves of the cottonwood grove were turning gold in the autumn sun, and, away ahead of them, the maples and oaks were a mass of flaming crimson.

"Last year this time," said Ned, "Dad was out duck hunting with Mr. Hinson."

"Yes," said Richard, "but I'll bet an army couldn't drag him away from the glider now."

"Isn't it funny, in the spring, he wouldn't look at a plane? Now, he's forgotten everything else, including golf."

"I see two airplanes over to the right," said Richard, after a while. "They're both coming this way."

"I wish we had the field glasses here."

Gradually the planes drew closer. "One's a lot larger than the other," Richard said. "And will you just look! They're both painted red!"

"Do you suppose the big one is the *Red Eagle?*"

"It certainly looks like it. But I wonder what the other plane is?"

Another minute and the boys in the tower saw that the larger airplane was indeed Uncle Jim's ship. Ned and Richard nearly tumbled down the silo steps and ran out to the edge of the field, just as both planes glided down for a landing. Uncle Jim stepped out of the big ship and greeted the boys, his same old self again.

"I've a little present for you," he said. "One of the pilots at the club brought it over." He pointed to the smaller plane.

It was exactly like the *Red Eagle* except in size. The cabin was small, but it appeared to be just right for three or four people. Upon its fuselage, in white letters, was the name RED EAGLE II!

"It is my gift to you for meritorious service in the race," said Uncle Jim. "The other pilot and myself are going to stay awhile and teach you how to fly!"

Ned's jaw sagged slowly open in surprise, Richard blinked, hardly believing his ears. In the meantime their father had brought the *Swallow* to a landing close by, and upon being told the amazing news, entirely forgot his dignity for the first time in years. It would be hard to tell which of the three was the happiest for they all went over the new plane examining each detail with the greatest delight.

"What's all this happening out here, Mr. Jameson?" It was Abbie. The sight of the two planes had been too much for her curiosity and she had come out to investigate.

Ned saw his father wink at Uncle Jim. "The boys have a new airplane, Abbie. Maybe they'll take you for a ride if you ask them."

Abbie looked frightened and began backing away.

Richard grabbed her arm. "Aw, Abbie, don't go. I think a little flight in the new plane would do you worlds of good."

Ned took her other arm and the two began pulling her towards the *Red Eagle II*. "Quick, Uncle Jim, start the motor. Abbie says she's going for a ride!"

Return

Abbie shrieked in dismay as Uncle Jim climbed into the smaller plane and the motor began to spark. "Heavens and Earth! You'll *never* get Abigail Abbott in a flying machine, and boys, if you don't let her go, she'll never make you another one of those cherry pies you like so well! Oh! *Please!*"

But Abbie's threats were of no avail, for in another minute she was bustled into the cabin of the smaller plane and the door was locked behind her. "Oh, what'll I do?" she cried, as the ship began moving over the field. "I just know you'll get me up in the air and you'll never get me down again!"

She kept her eyes tightly closed as the airplane left the ground and began climbing high in the air over Jameson Field.

"Come on, Abbie, take a peek through the window," begged Richard.

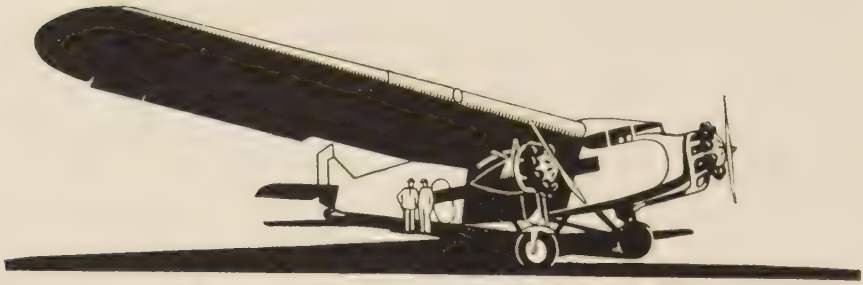
Abbie's eyelids flickered slightly, then she closed them tightly shut again.

"Aw, Abbie, be a sport," said Ned.

At last her curiosity became too much for her, as it always did, and she opened her eyes and leaned over to the window. She closed them almost immediately, but not for long.

"Oh!" she exclaimed, and looked again at the earth that seemed to turn slowly beneath them as the plane made a gradual bank. Fascinated, Abbie continued to stare through the windows as long as she was in the air, but not another word did she speak until the *Red Eagle II* had glided down to a landing on Jameson Field.

"Goodness, gracious me," she said at last as her feet touched the ground. "Just to think that I let you take me all the way up there!" and Abbie gazed at the clouds high overhead. "But never mind about those pies, boys. Abbie will make you all the cherry pies you can eat!"



AVIATION TERMS

THEIR MEANINGS AND HOW TO PRONOUNCE THEM

Key: ärt, āpe, făt, fâre, a̤ll; mē, gĕt; hĭt, īce; gō, nŏt, ôr; bo͝ot; ru̇le, cūre, bŭt; o͝il; e=k; ç=s; ḡo, ġem; iṉk; ẓ=z; French boṅ.
An acute accent (′) indicates principal stress; secondary accent (″) indicates less stress.

aerodynamics, ā″er-o-dī-năm′ics. Science of the air.

aerofoil, ā′er-o-fŏil. Any wing or lifting surface on an airplane.

aeronautics, ā″er-o-na̤′tics. The science of air navigation.

aileron, ā′le-rŏn. A controlling surface, usually at the wing tip, the operation of which causes an airplane to tilt to one side.

aircraft, âr′crăft″. Any machine capable of flight.

airdrome, âr′drōm″. A flying field with structures for housing aircraft.

airplane, âr′plān″. A heavier-than-air flying vehicle; in common use, an airplane suited to operation from the land.

air-speed indicator. An instrument for measuring the speed of an aircraft through the air.

altimeter, ăl-tĭm′e-ter. An instrument that shows at all times the height of an aircraft above the earth

amphibian, ăm-fĭb′i-an. An airplane capable of alighting on either land or water.

aviation, ā″vi-ā′shon. The science of mechanical flight in heavier-than-air machines.

aviator, ā′vi-ā″tor. One who pilots an airplane.

bank. To incline or roll an airplane sideways so that one wing is higher than the other; the position of an airplane when turning.

beam. A spar, the principal transverse member of a wing to which the ribs are attached.

biplane, bī′plān. An airplane having two main planes, one above the other.

ceiling. The height at which a given aircraft ceases to rise above a specified rate.

cockpit. The partially enclosed seat in the fuselage of a plane, the top being open to permit vision from all angles.

control lever, e̤ṉ-trōl′ lĕv′er or lē′ver. The "joy-stick," a lever for controlling an airplane either up or down, or from side to side.

cruising radius, cru̇ẓ′ing rā′di-ŭs. The distance which an airplane can travel without refueling.

dive. To descend more rapidly than the normal gliding angle.

dope. A compound with a cellulose base, used for treating cloth surfaces of aircraft.

double-decker. A biplane.

double monoplane, dŭb′l mŏn′o-plān. A tandem monoplane.

duralumin, dū″ra-lŭ′min. An alloy of aluminum and other metals, with the strength of steel and one third its weight, much used in airplane construction.

elevator, ĕl′e-vā″tor. A wing surface hinged to the horizontal stabilizer, used in steering an airplane in an upward or downward direction.

empennage, äṅ″pĕn″näzh′. The tail group of an airplane, used to steer or steady it.

fin, tail fin. A vertical plane used to increase stability and to hold the rudder.

flight. The rise and passage of an airplane through air, distinguished from **ascent,** the rising of a balloon.

float. A type of landing gear which provides buoyancy on the water.

flying boat. A seaplane provided with a boat for alighting on water.

fuselage, fū′se-laġ. The body of an airplane, extending from the nose to the tail.

glide. To fly without engine power.

hangar, hăn′gär″. A structure for housing airplanes.

helicopter, hĕl″i-ĕop′ter. An aerial vehicle sustained and propelled by one or more air screws turning on vertical axes, without the use of supporting planes.

hydroairplane, hī″drō-air′plān; or **hydroaeroplane,** hī″drō-ā′er-o-plān. An airplane capable of alighting on and rising from the water; distinguished from **hydroplane,** a high speed motor-boat.

ignition, ĭg-nĭsh′on. The means of exploding the mixture in an internal combustion engine.

inclinometer, ĭn″cli-nŏm′e-ter. An instrument used to show an upward or downward movement of an airplane.

joy-stick. Common term for control lever.

landing-gear. The underbody of an airplane which carries the load when resting or moving on land or on water.

longeron, lŏn′ġeron. Any long spar running lengthways of the fuselage.

monoplane, mŏn′o-plān. An airplane with a single set of wings.

multiplane, mul′ti-plān. An airplane with more than one set of wings.

nacelle, nä″çĕl′. Any enclosed and streamlined body in an airplane that does not extend to the empennage; distinguished from fuselage, which runs the length of an airplane and has controlling surfaces attached.

nose. The bow of an airplane.

ornithopter, ôr″ni-thŏp′ter. An aircraft supported and propelled by flapping wings.

pancake. To level off an airplane at too great a height in the act of landing, causing it to lose flying speed and descend too nearly vertical.

pilot, pī′lot. One who controls an airplane while in flight.

propeller, prō-pĕl′er. A device of two or more blades set at a pitch which transforms rotary force into straight line motion; the mechanism which acts upon the air and propels the airplane.

rudder. A plane, usually hinged to the tail fin, for steering to right or left.

seaplane. An airplane provided with a landing-gear for operation from the water.

shock-absorber. A device for deadening the impact of an airplane when landing.

side-slip. To fall as the result of an excessive bank or roll.

skid (verb). To be carried sideways when turning to right or left.

skid (noun). A runner in an aeroplane's alighting-gear.

slip stream. The stream of air produced by the whirling of the propeller.

spin. Same as tail spin.

spread, or **span.** The distance between the tips of an airplane's wings.

stabilizer, stăb'i-līz"er. A horizontal wing surface at the tail; part of the empennage. Also called horizontal stabilizer.

stall. To lose the speed necessary for control.

stream-line. To form a shape that will pass through the air with the least possible resistance.

strut, strŭt. A brace or support; an upright between planes.

stunt. An acrobatic trick or maneuver.

tachometer, ta-cŏm'e-ter. An instrument for measuring the speed of the engine.

tail. The rear portion of an airplane.

tail skid. A small skid placed under the empennage to receive the shock of landing.

tail spin. A steep descent in which the nose of the airplane is pointed earthward, and the tail is swirling in a circle above it.

take-off. The start of the flight.

tandem, tăn'dĕm. An airplane with sets of wings placed one in front of the other on the same level.

taxi, tăx'i. To move over the surface of land or water before rising and after landing.

tractor, trăc'tor. The type of airplane in which the propeller is in front of the engine, distinguished from pusher, where the propeller is located behind the engine.

triplane, trīplān. An airplane with three sets of wings, one above the other.

turn and bank indicator. An instrument for showing the tilt of an airplane to right or left.

undercarriage. Same as landing-gear.

wake. The stream of disturbed air following the course of an airplane.

wash. The disturbed air immediately behind an aerial vehicle.

wing spread. The area of the surface of the wings; distance from tip to tip.

wing tip. The outer extremity of the wings of a monoplane.

zoom, zōōm. To climb at an angle greater than the maximum climbing angle by means of excess speed.

SUGGESTED HELPS

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•

Vocabulary Analysis

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THE RED EAGLE offers a thrilling adventure to its readers. This story of how two brothers became real aviators is full of action, interest and charm. When the book is finished a surprise awaits you in discovering how much you have learned about aviation.

The Red Eagle holds interest and satisfaction for grades five and six, and is especially recommended to them. Ambitious fourth graders will enjoy following the experiences of the young flyers.

A summary of *The Red Eagle* vocabulary follows. (The number of words is exact. Percentages are approximately correct.)

23,837 running words
2,109 different words
1,862 number in Thorndike's list, or 88% plus, of which
744—35% occur in Thorndike's 1st thousand
368—17% occur in Thorndike's 2nd thousand
240—11% occur in Thorndike's 3rd thousand
256—12% occur in Thorndike's 4th and 5th thousand
254—12% occur in Thorndike's 5th — 10th thousands

A list of 247, including proper nouns, technical terms, and colorful interesting words contributed by aviation to our current vocabulary since *The Thorndike Teacher's Word Book* was published, accounts for the remaining 10%. Many of these words are quite simple and very interesting, and are readily understood.

A glossary of aviation terms is found at the end of the book with meanings given in clear, simple language.

CHAPTER I

QUESTIONS

1. Who were the characters in this chapter?
2. Who said: "Gee, wouldn't it be great if he taught us to fly!"
3. What was the name of the Dutch designer of German war-time planes?
4. Why was the plane called the Red Eagle?
5. What is the meaning of the word "contact"?
6. Did you ever hear of the famous "Camels and Spads"?
7. Do you know the meaning of "longitudinal stability"?
8. What is meant by "banking the ship"?
9. How did Thimble Mountain look from the air?
10. What do the following words mean: elevator, stabilizer, aileron, rudder, keel, empennage, fuselage, throttle, altimeter?

ACTIVITIES

1. Surely some member of your class has constructed a model airplane. Ask him to bring it to your room. Perhaps a classmate will explain the different parts of the airplane.
2. Find out how an airplane flies.
3. What instruments are necessary for every flyer?
4. In your dictionary find the true meaning of the following: aviation, aviator, aviatrix.
5. Cut pictures of different kinds of airplanes from newspapers and magazines and paste them in a booklet.

CLASS PROJECTS

1. In your newspapers or magazines find a description of an early airplane, especially those developed by the Wrights.
2. Draw a map of our country. On it show the present air routes.
3. List the various uses of an airplane today.
4. Select a member of your class to report how the government is assisting aviation today.
5. Find out how the Weather Bureau aids aviation.

FOR ORAL OR WRITTEN COMPOSITION

1. Uncle Jim lands in the pasture back of the Jameson country home.
2. Ned and Richard learn about the different parts of a plane.
3. How a flyer becomes an "Ace."
4. The boys take their first flight.
5. Why I would like to learn to fly.

FOR ADVANCED STUDY

1. Look up the invention of the airplane.
2. Read about Lindbergh's flight from New York to Paris.
3. Try to find out about present-day requirements for a pilot's license.

CHAPTER II

QUESTIONS

1. Why was the following week a happy one for Ned and Richard?
2. Before a flight is it necessary to adjust the altimeter?
3. Can you tell the difference between a barometer and an altimeter?

4. What is the difference between an elevator and a stabilizer?
5. Did Richard and Ned lose interest in fishing? Why?
6. Who was Abigail Abbott?
7. What do the following mean: silhouetted, ignition, dejectedly, monstrous, ace, cross-country, perceptible, substituted, bungled?
8. Why did Uncle Jim expect to return home soon?
9. What reasons can you give for Uncle Jim having landing lights on the wings of the Red Eagle?
10. Have you ever seen a flare?

ACTIVITIES

1. Make a skeleton outline of this chapter.
2. Dramatize the scene when Uncle Jim sold "aviation" to Mr. Jameson.
3. Draw a map showing the Jameson country home, flying field, Cripple Creek, Thimble Mountain, Hinson's woods.
4. Find a picture of an early airplane. Compare it with the picture of the Red Eagle.

CLASS PROJECTS

1. Dramatize the story of "Making a Convert."
2. Make a colored poster showing Ned and Richard with their string of fish on the banks of Cripple Creek.
3. Make a list of the uncommon words found in this chapter. Look up the meaning of each word and use it in a correct sentence.
4. Early in 1935 an airplane dropped foodstuffs to a snow-marooned family in New Jersey. Find in your newspapers a description of this incident.
5. Surely some of you must know a pilot. Write a letter to him, inviting him to address your assembly.

FOR ORAL OR WRITTEN COMPOSITION

1. Mr. Jameson describes his first flight.
2. Why Richard and Ned were glad to have their father fly.
3. The fishing hole at Cripple Creek.
4. An air speed indicator.
5. Thrills in flying.

FOR ADVANCED STUDY

1. Prepare an assembly program to illustrate what the following have contributed to aviation: Orville and Wilbur Wright, Glenn Curtiss, Charles and Gladys Day, Anthony Fokker, Colonel Charles A. Lindbergh, Colonel Clarence Chamberlain, Clyde Pangborne, Richard Byrd, Amelia Earhart.
2. Watch the newspapers for radio talks on aviation. Report one of these talks to your class.

CHAPTER III

QUESTIONS

1. How did the boys feel about Uncle Jim's unexpected departure?
2. What is a silo?
3. To what use did the boys put it?
4. Why was the transport model unable to fly?
5. What is meant by empennage?
6. What made the father order his boys to remove all their paraphernalia from the old silo?
7. Were the sons obedient?
8. Do you think that Mr. Jameson had taught them to "talk back" when given an order?
9. Was the father right in keeping his plans a secret?

ACTIVITIES

1. Make a poster showing the transport model. Invite a member of your class to explain the various parts.
2. Reread page 34. Notice the series of word pictures. Try to remember all the pictures which form a complete story of the flight of the transport model. Practice this in all your reading.
3. Make a crossword puzzle using words from *The Red Eagle.*

GOOD READING HABITS

The following hints will enable you to develop good physical habits of reading:

1. Develop a correct posture.
2. See that you have the proper light.
3. Keep your book at the right distance from your eyes.
4. Be sure you hold your book correctly.
5. Never point to the words.
6. Read silently and without lip movement.
7. Use your dictionary constantly.
8. Read to remember.

MAKING AN INDEX

Do you know how to make an index? Below are a number of words found in *The Red Eagle.* Arrange them correctly as an index.

hangar	airport	flying
curiosity	mysterious	glider
fuselage	Richard	monoplane
ailerons	elevators	joystick
Kitty Hawk	take-off	reservoir
thrilling	eligible	instruction
aeronautical	discovery	reshingled

CLASS PROJECTS

1. Make a list of twenty-five words that can be used for a lesson in spelling.
2. Many girls and boys have hobbies such as collecting stamps and coins. Why not begin a stamp collection? Naturally you would want to include airmail stamps. See how many you can collect.
3. Get a weather map and learn how to read it.
4. Read the story of Darius Green and his flying machine.
5. Prepare a number of silhouettes that will convey the story in Chapter III.

FOR ORAL OR WRITTEN COMPOSITION

1. My own workshop.
2. How to make a model airplane.
3. The great flight I like to read about.

FOR ADVANCED STUDY

1. There are certain laws that concern airplane flights today. Find out about these laws. Why is it necessary to have laws?
2. Name all materials used in constructing an airplane. From what foreign countries does each come? Why do we not find all the necessary materials in America?

CHAPTER IV

QUESTIONS

1. How did Uncle Jim tease his nephews?
2. What did the boys expect to find in the freight package?
3. Were they disappointed?
4. Do you agree with Uncle Jim that gliding is safer than flying with a motor? Explain.
5. Who first discovered the art of gliding?

6. What prompted the Germans to experiment with gliders?
7. What is a sailplane?
8. In what way would Ned and Richard begin their experiments?
9. Are sailplanes for beginners or for more advanced students?
10. What two methods are there for flying a glider?

USING THE DICTIONARY

1. Name at least three things that the dictionary tells us about each word.
2. Make a list of all the "hard" words found in Chapter IV. Arrange them in alphabetical order. Then write the meaning after each word.

POETRY

1. Numbers of poems have been written about flights and aviators. Find some of these and read them to your class.
2. Perhaps some of your class would like to write a poem about a hero of the air.

POSTER WORK

1. Make a colored poster entitled "The Magic of Motorless Flight."
2. On a sheet of brown paper draw the hangar and silo.

FOR ORAL OR WRITTEN COMPOSITION

1. A huge freight package.
2. The building of a glider.
3. The development of gliding.
4. The story of Otto Lilienthal.

WHO SAID THE FOLLOWING:

1. "What is that hook on the nose of the fuselage for?"
2. "How can anyone stay in the air all day long without an engine?"
3. "Gliding was originally developed in Germany by Otto Lilienthal back in 1894."
4. "I suppose the time has come to tell our little secret . . ."
5. "Just control your curiosity, young man."

FOR ADVANCED STUDY

The editor recommends any or all of the following books for your class to read. Make either oral or written reports on them:

AUTHOR	TITLE	PUBLISHER
Allen	Model Airplanes	Stokes
Boy Scouts of America	Model Airplanes How to Build Them	Boy Scouts of America
Dobias	Picture Book of Flying	Macmillan
McNamara	Playing Airplane	Macmillan
Thomson	Aviation Stories	Longmans Green

CHAPTER V

QUESTIONS

1. Does it seem strange to you that a glider should be pointed earthward in order to make it soar skyward?
2. Why is a rubber rope used?
3. Did Richard become nervous during his first ascent?
4. What were his impressions?
5. Might the nose dive have proven fatal?
6. Do you think that Uncle Jim had given the boys sufficient instructions before allowing them to glide?

7. How did Mr. Jameson feel toward a tree that he had always admired?
8. What is "dope"? Would other varnish answer the same purpose?
9. In what way does a glider resemble an airplane?

EXPLANATIONS

Explain the following words and phrases:

cockpit	neutral position	preliminary explanation
rudder controls	duplicated	in desperation
fouled	take-off	demonstration
inspiration	chauffeur	undulation

OPPOSITE MEANINGS

An antonym is a word which in meaning is directly opposed to another word. It is the opposite of synonym. For example, ascend and descend. Below is a list of words for which you may find antonyms:

slow	cloudy	finished
fright	careful	night
above	pull	clumsy
end	nervous	higher
start	breeze	brilliant
torn	dry	intelligent
happy	unknown	cheap

ACTIVITIES

1. Show how times have changed since the days when Buffalo Bill was a Pony Express rider.
2. Procure a copy of *The National Geographic Magazine* for June, 1932. Read the article by Gladys M. Day describing her flight around the world. Be sure you study the aerial photographs.

3. Perhaps some member of your class owns a pocket compass. Ask him to bring it to school so that you can examine it carefully.
4. Some of you may have friends at an airport who will permit you to borrow airplane instruments. You will be interested in them.
5. Read your newspapers and try to learn how many products are sent from California to New York by airplane.

FOR ORAL OR WRITTEN COMPOSITION

1. The story of Richard Byrd.
2. The future of aviation.
3. Thunderation Elm.
4. The fun in gliding.
5. A modern catapult.

LIST OF ADJECTIVES

Consult your language book to find out what an adjective is. Then make a list of adjectives or words which best describe the character of an aviator.

FOR ADVANCED STUDY

1. In the Arlington cemetery near Washington stands a monument erected to the memory of the first aviator killed in that vicinity. On the monument are these words: "The progress of the living is marked by the deeds of the dead." Explain the meaning of this thought.
2. Procure a picture of your favorite air hero for your classroom. Be prepared to give the story of his life.
3. Add pictures of Amelia Earhart to your airplane booklet.

CHAPTER VI

QUESTIONS

1. How did Abigail Abbott feel toward gliders?
2. What were her reasons for taking unusual precautions in looking up?
3. Was this a challenge to the amateur flyers?
4. Which members of the family took the Swallow?
5. What advantage did the Swallow have?
6. What caused the whirling eddies of air? How did they affect the pair gliding along so peacefully?
7. What is a posse?
8. How did Ned judge the whereabouts of the fugitives?
9. Who were the "murderers" that Mr. Jameson and Uncle Jim spotted?
10. Did the boys have any better luck?

WHO SAID THE FOLLOWING:

1. "Oh, Abbie, if you'll just take a ride in the glider, I know you'll enjoy it." (page 53)
2. "Well, why don't you let me take you for a spin in the Red Eagle?" (page 53)
3. "I'm not taking any chances." (page 54)
4. "Oh, murderers don't hide in caves any more." (page 56)
5. "Well, I don't see any hills close by." (page 58)

POSTER WORK

1. Procure pictures of a Fokker airplane. After making a careful study of its design, construct a colored poster for your room.
2. Make a poster that will illustrate one of the incidents of sail flying.

A FLYING CLUB

Perhaps you would be interested in organizing a flying club in your school. Many schools in the country have these clubs. Your teacher will help you select officers, write a constitution, and define your aims.

FOR ORAL OR WRITTEN COMPOSITION

Prepare either oral or written compositions using the following suggested topics:

1. The life of Anthony Fokker.
2. Building a sail plane.
3. How a glider soars.
4. The experiences of Abbie Abbott.
5. An imaginary flight over my town in a glider.

VOLUNTEER WORK

By this time you are undoubtedly familiar with numerous books and magazines that give information about aviation. Select an interesting article from one of these. Read it carefully making notes of the different facts. Give a summary of the article before your class. Be sure you mention the name of the paper and the author. Some of your classmates might want to refer to the same description.

YOUR FIRST AIRPLANE

Each one of us remembers the first airplane we saw flying. What do you remember about that airplane? Try to answer the following questions about your first airplane, using correct English:

1. Where and when did you see the airplane?
2. What kind was it? (biplane or monoplane)
3. Was it a Stinson, Ford, Fokker, or some other kind?
4. How high was it in the air?

5. What did the sky look like?
6. Where was the plane going?
7. What color was the airplane?
8. Did it have more than one motor?
9. Did it carry passengers, mail, or express?
10. Did you find out the name of the pilot?

CHAPTER VII

QUESTIONS

1. What is meant by "slotted wings," "a tail spin," "flying windmill," "autogiro"?
2. What great advantage has the autogiro?
3. How can an aviator tell when his plane is tipping forward or backward? From side to side?
4. What do airplane mechanics mean by "dural"?
5. What are some of the well-known airplanes mentioned in Chapter VII?
6. How did the boys behave in the orientator?
7. Have you ever seen one of these devices? Would you be comfortable during its "antics"?
8. What other tests must prospective pilots take?
9. Which boy excelled in the equilibrium test?
10. Do you think the boys regretted the fact that their father was unable to come to the race? Why?

POSTER WORK

You will enjoy making colored posters for your room illustrating each of the different planes mentioned in this chapter.

Perhaps some merchant in your vicinity would permit

you to display these posters, or others you have made, in his store window. Remember that the people of your community will enjoy seeing your work.

THE WEATHER BUREAU

If there is a Weather Bureau in your vicinity, you should make an effort to visit it.

The Weather Bureau supplies our daily newspapers with information about the weather. These reports are usually found on the front page.

Read these reports and keep a daily weather record on your blackboard for a month.

What people depend on the Weather Bureau for information about the weather besides aviators? Explain.

OVER NEW YORK

Once I flew over New York in the summer. The plane was a Curtiss Jenny with a water-cooled motor. At that time the radial engine was not used in that type of plane. At an altitude of two miles the water in the radiator began to boil. It was so cold in the skies that I nearly froze to death. Can you explain why the water boiled and why it was so cold?

REFERENCE BOOKS

Using your reference books try to find out the difference between:

1. A radial engine and a water-cooled engine.
2. A glider and a sail plane.
3. A seaplane and a hydroplane.
4. An inclinometer and a turn and bank indicator.
5. A Curtiss Condor and a Fokker.

CHARACTER SKETCHES

Write character sketches about:

1. Handley-Page.
2. Anthony Fokker.
3. Glenn Curtiss.
4. Maurice Dornier.
5. Captain Jameson.

BUMPS

Like the waves of the sea the air is sometimes rough. Perhaps some of you in flying have noticed the "bumps" of the air. You have undoubtedly heard people speak of "holes in the air." Try to find out what causes these so-called "bumps." Talk with a pilot and ask him how he tries to "weave them out."

PASSENGER RATES

To fly from Berlin to Paris, a distance of 552 miles, it costs $46.00; to fly from Sacramento to San Diego, approximately the same distance, the ticket costs $31.19. In other words, throughout Europe on the average it costs about 8½ cents a mile to fly as compared to 6 cents in America. Explain why it costs more to fly in Europe.

CHAPTER VIII

QUESTIONS

1. What airplanes entered the race besides the Red Eagle?
2. What device was used to increase the speed of Uncle Jim's plane?
3. Was the boys' uncle depending entirely upon speed?
4. What other quality sometimes counts more in the end?

5. Can you name one of Aesop's fables where that same principle was involved?
6. How was the message picked up at the end of the westward trip?
7. In what way did the soaring plane become lighter?
8. Can you imagine Ned's delight when his uncle gave him the controls? Why did he do this?
9. What menace appeared?
10. How was their joy at catching the message changed to terror?

WRITING SENTENCES

Write correct sentences using the following words:

biplane	monoplane	seaplane
Ryan	Fokker	Wright
radial	cross-country	message
oxygen	mosaic	eternal

FOR ORAL OR WRITTEN COMPOSITION

Write original compositions on any of the following topics:

1. My favorite airplane.
2. Flying through a storm.
3. Dropping a message.
4. Winning a race.
5. Some secrets of success.

A BULLETIN BOARD

Perhaps some boy would like in the manual training shop to make a bulletin board for your classroom. Call the bulletin board "Plane Paragraphs." Place news items of importance about aviation on this board for your classmates to read. Try to keep posted on the progress of flying in the world.

SPELLING CONTEST

Select from *The Red Eagle* a list of words that can be used for a spelling test. Choose sides, and determine which group can spell the best.

DEBATE THE FOLLOWING TOPICS:

1. Resolved that airplanes should not fly low over cities.
2. Resolved that each state should create a State Aviation Commission to tax airports, airplanes, pilots, and manufacturers of all kinds of aircraft.
3. Resolved that aviation courses be given in all schools.

ACTIVITIES

1. Find out about the lighted beacons that illuminate air routes in our country.
2. Turkey is slowly becoming air-minded. The government is trying to interest the Turkish youth to learn to fly. Already they have an organization known as the "Turkish Bird." Watch your papers for items about aviation in this ancient country.
3. Recently a plane carried a Ford automobile to a high altitude to test starting it at low temperatures. Try to find out about this experiment.
4. A few months ago the American Airlines built some sleeper planes, nicknamed "Air Pullmans." The service opened between Los Angeles and Fort Worth, Texas. Each night the "air sleepers" were practically filled. Thus it can be seen that this new type of airplane was popular from the beginning. Read your daily newspapers and note the progress of night flying.
5. During the past year there has been a tremendous increase in air express traffic. How do you account for this?

FOR ADVANCED STUDY

1. Read about Commander Byrd's airplane achievements in the polar regions. You will find excellent accounts of them in *The National Geographic Magazine.*
2. What can be done to induce all cities and towns to record their names in large, bold letters so that passing birdmen can identify them?

CHAPTER IX

QUESTIONS

1. Could you have kept your head, with Uncle Jim unconscious, the plane in a tail spin and a storm raging?
2. How did he keep the ship on an even keel without seeing the ground?
3. What had really happened to the boys' uncle?
4. How did he explain his collapse?
5. Were there any more thrills on the return trip?
6. What was the purpose of the escort?
7. How was Ned put to a severe test?
8. What is meant by a two-point landing?
9. What surprise awaited the boys?
10. Were they surprised to learn that their plane was the first to arrive?

ACTIVITIES

1. Assume you were present at the emergency test. Write a letter to a friend telling him some interesting things about it. Carefully reread your letter to see if you have made any mistakes.
2. Ask some boy to make a microphone in his shop. Let different members of your class broadcast news of the test.

3. Copy the following sentences, using the correct word in each blank:
   1. Suddenly Ned turned _____ the strap. . . .
   2. We went into a _____ when the storm hit us. . . .
   3. Uncle Jim directed the _____ of the plane. . . .
   4. Looks as if we are one of the _____ winners.
   5. The plane's right _____ and tail _____ touched the ground. . . .
   6. As Ned and Richard opened the _____ of the _____. . . .

(A perfect score is 8)

POSTER MAKING

Make a colored poster that will illustrate a scene during the emergency test.

TELLING A STORY

Prepare a story about *The Red Eagle*. Stand erect facing your classmates. Remember that a good beginning will attract the attention of your audience. If your first sentence is a good one, the class will want to hear all of your story. Notice how the author writes the first sentence in this chapter. Read that sentence again. Do you then not want to hear what happened to Ned?

MAKING AIRPLANE SAFETY RULES

Is it not necessary to have traffic regulations? Despite these there are many unavoidable accidents. Why is it necessary to have safety rules? If drivers and pedestrians are not careful, accidents will happen.

There are so many airplanes today that it is necessary to have air safety rules. Why? Already we have many rules for safety in the air. Make a list of all the safety rules

that you can find. Add others to your list that will aid in the protection of life and property.

LEARN TO RECOGNIZE SENTENCES

Below you will find a few groups of words, some of which give complete thoughts while others do not. The words which give a complete thought or really tell something form a sentence. Check all the sentences:

1. It's all I can do to manage the plane.
2. A canteen of water.
3. We went into a tail-spin when the storm hit us.
4. Ned shuddered.
5. In the Red Eagle.
6. The boys noticed a small group of airplanes approaching them.
7. The landing field of the flying club.
8. Back on the stick.
9. A great cheer went up from the crowd outside.
10. The Red Eagle wins first place!

CHAPTER X

QUESTIONS

1. After Captain Jameson had been carried away on the stretcher, what message was announced to the crowd?
2. How was this message given?
3. Was the boys' father angry because they had not waited for his consent to fly in the race?
4. Would he have given his consent, if he had received the message?
5. For what did he give them credit?
6. What is meant by "triangles of wild geese"?

7. How long had it taken Mr. Jameson to become air-minded?
8. What appeared in the sky besides the wild geese?
9. Can you explain, "reward for meritorious service"?
10. How was Abigail Abbott cured of her fear?

FOR ORAL OR WRITTEN COMPOSITION

Prepare either oral or written compositions on the following:

1. The Red Eagle II.
2. Mr. Jameson lands the *Swallow*.
3. How to become air-minded.
4. Abigail Abbott enjoys her sky ride.
5. The joys of piloting a plane.

PROBLEMS IN ARITHMETIC

1. From London to Karachi, India, it is 4,622 miles. An airplane ticket costs $475.00. What is the cost per mile?
2. Assume that an Aeronica plane uses three gallons of gasoline an hour and the average speed is 85 miles an hour. Find out how much it would cost to fly between any two cities whose distance you may know. Figure gasoline cost at present-day prices.
3. From the answer in question 2, compare the cost of operating that type of plane with your family car.
4. If it costs 6 cents a mile to ride in commercial planes, and a ticket from Chicago to Toledo is $13.25, how many miles is it?

ACTIVITIES

1. Find the poem—"If I Had Wings Just Like a Bird." Read this aloud to your class.

2. Your library should have a shelf of books on aviation. Select the one book that most appeals to you and report orally to your class.
3. List the scientific magazines that devote much space to aeronautics.
4. After the loss of the Macon at sea, our government has become discouraged about dirigibles. What is your idea about dirigibles?
5. Did you know that trees used airplanes long before man dreamed of inventing them? Nature has always used airplanes of a glider type to disperse her seeds. The seed of the willow tree has a fluffy parachute so that it can glide for miles with the wind. And the pods with tiny fibers containing the seeds of the cottonwood tree float like magic in the air. Who has not seen the maple seeds with outstretched wings? Many other plants and trees have flying seeds. If your time permits, make a study of this interesting subject.
6. It has been impossible to prepare all the exercises you might like to do. Perhaps there are some that you have thought of and that you would like to do. Make a list of these original exercises and submit them to your classmates for study and criticism.
7. If you have ejoyed *The Red Eagle* and the exercises, write a letter to the editor, in care of this company. He will be glad to hear from all the children who complete *The Red Eagle*. If you have any ideas about aviation or books on the subject do not hesitate to express your thoughts and suggestions.

J. Earle Thomson, *Editor*

HINSON'S WOODS
BEACON
THIMBLE MOUNTAIN
THUNDERATION ELM
GRADED RUNWAYS
BEACON & BOUNDARY LIGHTS AT CORNERS
WIND INDICATOR
OBSERVATION SILO
JAMESON FIELD
HANGAR
HINSON ROAD
BEACON

CRIPPLE CREEK
ROUGH MOOR
DIRECTION MARKER
N
Airplane View of JAMESON FIELD and Surrounding Country
ORCHARD
OTTONWOOD GROVE
THE HOME OF THE JAMESONS
STATE ROAD